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AMERICAN JOURNAL of PHARMACY

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A Record of the Progress of Pharmacy and the Allied Sciences

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THE AMERICAN
JOURNAL OF PHARMACY

VOL. 97. JANUARY, 1925. NO. 1.

EDITORIAL

"TO ALL."

This Christmas the little drug store around our corner carried a giddy-colored paper clear across its window and it bore the cosmopolitan message—

A MERRY CHRISTMAS TO ALL.

Many a cynic passed by that window and sneered at the presumption of that genial drug store man. For he had the courage to make his expression unique. His "To All" had a blessed irreverence of creed, of caste and of color.

And his good wishes ascended to the eminences and drooped to the lowly as well. Kings on their cushioned thrones and witless wanderers of the wilderness shared in his gift of greetings.

Truly this is the spirit of Christmas. For if the Baby of Bethlehem brought nothing but this, the manger would still be glorified.

Presumption is infectious—and its period of incubation is short. So, inoculated with the courage of our friend of the drug store, we write in this, our brief card of New Year well-wishing,

A HAPPY NEW YEAR TO ALL.

To our subscribers and especially to our contributors we add our usual message. It is one of grateful acknowledgment to those who have displayed a kindly interest in our honest endeavors and who have helped to make the JOURNAL readable and worth while. And thus in written record we pledge ourselves anew to keep it in the serviceable place which it has long since filled, with honor and with credit.

IVOR GRIFFITH.

ANOTHER CENTENARY.

Each year is, of course, a centennial anniversary of some event, but now and then years occur in which people like to review some incident of a century previous: 1923 included the centenary of the first announcement of the Monroe Doctrine, and 1924 saw the celebration of the founding of two Philadelphia institutions that have world-wide fame—The Franklin Institute and the Historical Society of Pennsylvania. In the same year the Frenchmen have been celebrating another event, the publication and adoption of the Gay Lussac tables of alcoholic strength. Of course, the affair was restricted to very few and gained no national character. The firm of L. & R. Dujardin, of Paris, has issued a pamphlet containing much interesting matter concerning the older methods of determining the strengths of mixtures of alcohol and water.

It appears that determination of specific gravity of liquids by the flotation of a ballasted bulbed tube was known to the Romans. One legend is that the method was invented by Hypatia, whose tragic death at the hands of Cyril of Alexandria is vividly described by Gibbon. Another story ascribes the invention to a Roman who lived in the days of Tiberius Cæsar. A figure given in the Dujardin pamphlet shows a hydrometer with a small platform on the top of the stem for the reception of weights, thus exemplifying the areometer.

Many were the methods employed for determining the strength of spirits, most of them hinging on the fact that a reasonably strong spirit will set fire to combustible substances when ignited in contact with them. It was in 1680 that Charras suggested the test with grains of powder, long known as the "proof" of the spirit. Baumé, a little before the date of the American Revolution, perfected a hydrometer and devised scales for it. The instruments were often made of silver and Baumé gave the job of manufacture to a silversmith by the name of Cartier, who succeeded in getting his name attached officially to the instrument. There was much discussion and legislation concerning the alcohol problem, that is, the determination of the actual amount of the alcohol in the several products on the market. Cartier's instruments had arbitrary marks, but in 1824 Gay Lussac, after very careful research, constructed a hydrometer with centesimal graduations, so that the proportion of real alcohol could be read off directly. To establish these graduations accurately, he

carried out many tests, with alcohol brought to the lowest water content by simple distillation and then completely dehydrated by quicklime or baryta. The employment of the alcoholometer was not only needed in the buying and selling of spirits, but the collection of the tax, so important a part of French fiscal methods, was greatly aided by the use of the simple and accurate instrument. Notwithstanding the fact that Cartier succeeded in intruding his name in certain official circles in France; Baumé has been recognized by the world at large as the devisor of the hydrometer for general purposes, and Baumé degrees, though arbitrary and not altogether convenient, are still extensively used in the industries.

HENRY LEFFMANN.

ORIGINAL ARTICLES

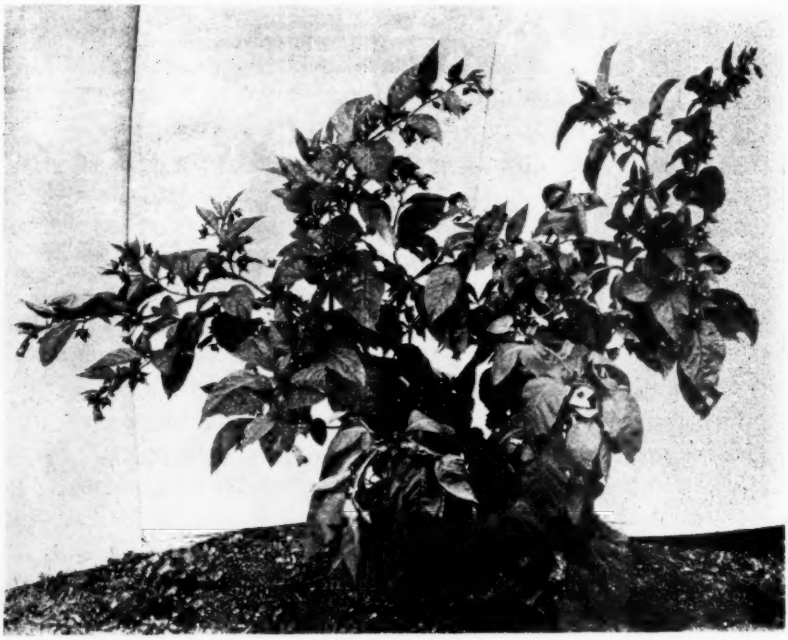
RAMBLING AMONG THE NIGHTSHADES.

By Fred B. Kilmer, Ph. M.

"I ha' been plucking (plants among)
Hemlock, Henbane, Adder's Tongue,
Nightshade, Moonwort, Leppard's bane,
And twice by the Dogs, was like to be ta'en."

—*Ben Johnson.*

Here is a belladonna plant, living in its glory of bush, branch and leaf, purple lobed pendant flowers, and luscious wine-colored berries. Let us seek for its origin.



A Flowering Belladonna Plant.

Teased into its simplest form under the microscope, it comes to a mass of cells strung together to build up a structure. The

end is a jelly speck—a protoplasm, an elusive thing about which little is known.

Whence did it come?

Backward, through unmeasured eras of our spinning globe, to the shores of the primordial seas, amid the pools left by the receding waters, we find the first living things—floating masses of blue-green algæ.

In science there is always something that went before.

From whence came the living things?

We have several possibilities: There is Lord Kelvin's idea that living things reached the earth in the crevices of a meteorite. This shifts the origin of living things from earth to elsewhere.

Until a century ago, spontaneous generation accounted for the beginning of life. The idea seems to be coming back again.

Vitalism, the traditional belief of life's origin, teaches that something new entered the earth, moved on the lifeless planetesimal dust, and things lived.

This is not far removed from the Hebraic "God spake! and there was life."

From the mechanistic view, life arises out of new combinations of pre-existing matter. The physicochemical energies form and re-form the elements and build up the living structure. Energy created, creates and sustains life.

But we are still far afield from the real beginning of the humblest plant. When we have found the origin of life, we must still search the moving cause of the origin.

The most ardent followers of Darwin or Lamarck confess ignorance of the origin or the laws of variations in living things. We seem to know that fluctuating variations are ever occurring. In the struggle for existence there is a continual sifting, a selection of outward form and inward constitution.

The best we can do for our belladonna is to piece together that which has been revealed in man's study of plant life, and add a bit of speculation.

Beginning with the trembling, slimy algæ, we climb through the eras of seaweeds, mosses and ferns, thence to shrubs and bush, and finally reach on to the wealth and variety of flowers, fruits and foliage that clothe our earth. By likeness, but more by differences, these fall into groups, with groups within groups.

Among the bell-shaped flowers in the solanum group, we find the mydriatic nightshades, including belladonna.

Who discerned the first belladonna plant? Not man. Long before the first sub-man appeared, creeping, crawling, flying things had used its substance to sustain life. Animals, before man, discriminated between plants that were salutary and those which were noisome.

Where was the home of the first belladonna plant? The answer can only be speculative. We are fairly agreed that the earliest traces of life (plant and animal), are found in Central Asia. The somewhat allegorical "Garden of Eden" has moved over the entire globe.

Belladonna in the edge of the Hercynian forest, which in the author's belief represents the original type. (Courtesy Gehe & Co., Dresden—N.)

We do not doubt that vegetation and animal life in the early periods of time were shifted—forced southward by the Glacial Ice Cap, returning northward as the ice and cold receded.

While we look upon plants as things rooted immovably in one spot, at some stage of their lives they are able to change their location, and they do so.

They crawl, they creep, they walk, they float, they fly. In their migration, under the stimulation of changed environment, they adapt themselves to new conditions, and sometimes slowly, sometimes swiftly—change.

Hence it might be imagined that the Daturas, probably one of the earliest and the most widespread forms of narcotic solanums, somewhere split off a belladonna. This is purely a guess—it probably never happened; yet,—it might have happened.

The narcotic solanums grow almost everywhere on earth that anything else will grow. In our region stramonium is a noxious weed. Tobacco flourishes in many climes. The Datura, in tropical lands, becomes a luxuriant tree.

Belladonna has never traveled far. Except for a rather exceptional instance, where the Atropa belladonna is found in the Himalayas, its home seems to be in a restricted area of Central Europe.

In organic life there are disadvantages which follow prolonged existence in one life zone. Confined for ages to one environment, races and species may disappear. Under a changing life zone, primitive stocks tend to develop differences of form and function.

Assuming that some of the narcotic nightshades have migrated through every continent, we see in part the causation of their varying form.

The belladonna, on the other hand, has remained "at home." It may thus have lost some of its primary characteristics, but it has not changed to any great extent.

Until within a few generations, belladonna did not have the stimulus of cultivation, a cause which brought such marked changes in other forms of plant life.

Hence, again we may guess that the Atropa belladonna, as it stands before us in the edge of the European forests, closely follows its more primitive form.

As it appears to us today, so it may have appeared to the first man who looked upon it.

The narcotic solanums were here when man came. His ancestors and all animal kind, even to the creeping, crawling, flying things, had known them and of them.

In the study of noxious plants, it is a curious phase to find that in many instances living beings are either immune, or have in some way acquired an instinct by which they may take them or let them alone. Low in the scale, when compared with man, other beings seem to possess more keenly developed senses, or perhaps more kinds of senses, along these lines.

When the noxious solanums are brought into territory where they were never seen before, it is observed that insects at once feed on them without harm; that birds eat the fruits; that cattle and other animals shun them; that man—civilized, cultured man, having perhaps lost his primeval instincts, is poisoned by them.

Man's First Knowledge of the Nightshades.

In that uncertain long ago, which the geologists term the "Pliocene Age," man came into a world of great silent hills and green valleys, clothed with trees and fragrant flowers, a world of soaring birds, flying and creeping insect life, varied and luxuriant plant and animal forms. His knowledge of living things was implanted by his man-ape ancestry.

We may well believe that man's first cognizance of the noxious solanums was not a discovery, but an inheritance.

Primordial man found in plant life, fruits and nuts for food, leaves and grass with which to clothe and shelter himself from the burning sun and storms. The leaves held power to cure his ills.

He was swift of foot, agile of limb, powerful of vision. With the dawn and slow coming of mind, he laughed, gestured, gamboled, danced, wondered and feared.

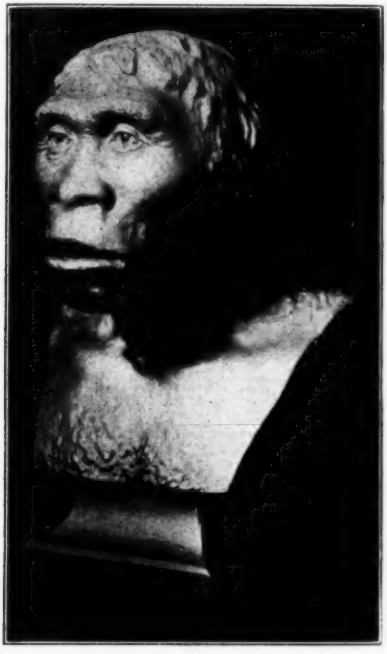
In part inherited, in part born of experience, in another part a fanciful creation of an evolving brain, came the idea of things forbidden; things not to be touched, eaten, used, or even looked upon; things taboo. "Of the fruit of the tree in the midst of the garden, ye shall not eat of it, neither shall ye touch it" was an inborn law, as well as an outward command.

The noxious nightshades were something apart, different from other plants. Leaf, root and branch held some power beyond the ordinary. Their presence, or the thought of them, carried some peculiar power.

Out of a jumble of such ideas, certain old men or old women were also set apart as possessing an unusual power over things animate or inanimate.

The Man of Magic acquired an extensive knowledge of the herbs of the forest and the field. He knew mandragora, hyoscyamus, the Daturas and belladonna; he knew their properties, their power for good or for evil. This knowledge, held in secret, placed him above his fellows, and created for him a place as Medicine Man, Priest and Potentate.

The magician had to do with the averting of angered gods or evil spirits, the making of rain, purifying streams and habitations, fertilizing soil, improving fecundity, preventing or removing blight of crops, and of staying of disease.



Pithecanthropus erectus, sub-man (restored), from whom the author believes man inherited his knowledge of the narcotic solanums. (Courtesy "N. Y. Tribune.")

In most of these the narcotic solanums had some part.

Belladonna and its allied plants would produce visions, dreams, delirium and destroy life; would quiet pain and cure disease.

To these the Medicine Man added supernatural attributes.

He placed them under the dominion of good and of evil spirits. They were controlled by the stars; they were used with incantations, prayers, songs and in the dance. They acted as charms, as amulets; they had power by their presence, or in their absence. Their color, shape, odor, taste, place and habit of growth contributed to their mysterious qualities.

A keen observer was the Man of Magic. It was he who first gained knowledge of the poisonous medicinal plants, and as possessor of the secrets of such plants as the narcotic solanums he held sway over his fellows.

Wherever there grew a narcotic solanum, magic was woven into the structure.

Before Written Records.

Before man could speak he transmitted thought through guttural sounds—groans; by gesture—through dumb show; by music—through the dance, and by many other means than spoken words.

Before speech, men had gathered themselves into tribes, become herdsmen, warred, migrated with the changing seasons, made weapons and tools, gathered the stars of the heavens into clusters and peopled them with deities; they had learned to sow and to reap, to gather trees, plants and flowers into groups and put them to use.

The formulation of speech was a new step forward in the power and range of the human mind.

Language and literature begins with the ballad dance, singing of songs, and tales of the bards; chanted stories of the past, stories of the living heroes, stories of the heavens, the waters, the earth and the sky.

They were the living books, the makers of tradition, artists of the eye, hand and tongue.

The songs of the prehistoric bards come down to us amended and reconstructed in the Teutonic sagas, the Greek epics, and the Sanskrit vedas.

In these, every plant is surrounded by a halo. They become a talisman against evil, the dwelling place of fairies, elves and imps; each plant was good or evil, according to the spirits that dwelt within them.

"By the outward shapes and qualities of plants we may know their inward virtues," is the doctrine of signatures coming to us from primitive man, which still cling to us in the sayings of the rustic, and in the names of many of our drugs, such as Liverwort, Eyebright, and the like.

The modern idea of the unity of nature seems to have been inborn in primitive man. In myths and legends every plant, as well as every living being, was under the dominion of some particular star or planet.

Epidemics, sickness and other affairs of life and the universe, were controlled by eclipses, comets, stars and the changes of the moon. Astrologic medicine begins with the first essay of man to explain the "reason why" of things.

As late as the eighteenth century, the narcotic solanums were placed under the dominion of Saturn, hence their austere, forbidding aspect. The healing qualities were imparted when the moon was on the increase; when the moon was in its decline, in unfavorable conjunction to the plants, poisons were generated.

The first legends of the solanums were stories of their hidden power and their curative virtue. Only as civilization advanced was their deadly poisonous power applied to criminal ends.

We believe that we are reaching the topmost rounds in human advancement. Is our use of deadly agents to destroy our fellows and ourselves an evidence of advance or of a decline?

The nightshades, or solanum-like plants, appear again and again in mystic lore. In this lore it is not easy to identify the particular solanums that we know. Plants with marvelous solanum-like power, at times seem to be our henbanes, again it is a Datura; often it is the fabled mandragora, and it might be translated into belladonna.

We can only glance at a few of them. "The sons of God," who took to themselves the daughters of men before the flood, taught the use of the mandrake in sorcery and enchantment, and believed that its powers were derived from the stars.

Isis learned of them from the heavenly messenger Amnael. She passed the knowledge on to Apollo, her son, and both hyoscyamus and belladonna have carried the name "The Herb of Apollinaris."

Chiron, the centaur, famous for his knowledge of medicinal plants, had Esculapius (the God of Medicine), Hercules and Achilles for his pupils. The solanums are woven into their story.

It was Medea, on one side an angel to the poor and sick, on the other a fiend from the nether regions, who instilled into the solanums their deadly poisonous power.

Somnus, the God of Sleep, gave to belladonna the name "Solanum somniferum" (the Herb of Sleep).

The wine of Circe, that turned the followers of Ulysses into swine, held a solanum. We have hogbane and pigbane as names for both hyoscyamus and belladonna, and these, as well as other species, became the "Enchantress Nightshade."

A dozen drugs have been surmised as entering into the nepenthe of Helen of Troy; among them stands stramonium, and again hyoscyamus, sometimes belladonna.

Ages before Greek tragedy, among barbaric peoples in lands where the solanums grew, there was a legend of the Fates that ruled in the birth, life and death of man, and to this death-dealing property these plants owed their Atropus-like power.

In every land where there grows a narcotic solanum, among people widely separated, among the most barbaric, this plant, or one substituted for it, becomes the center of marvelous legends. Fundamentally these stories are alike, notwithstanding the seeming impossibility of common origin.

In such tales the Atropa mandragora attains front rank; it is the male and the female "mandrake" of voluminous lore, reaching back into the very beginnings of thought. At times the same story is made to do duty to the mandrake, the Daturas, or to belladonna.

Typical of the mandrake legends is the quaint tale recorded in the Hebrew writings of the "Dudaim," or Love Apple, which when eaten by Rachel ensured conception. The essence of this story is found in the roots of the race; it probably precedes Genesis by thousands of years.

The influence of the mandrake as a love charm seems engrafted in the human race. From its reputed virtues ingenious authorities have created the legend of Aphrodite, the "Goddess of Love." The very name of the Goddess has been termed to mean "the fruit of the mandrake."

In the cult of Aphrodite and Artemis (Goddess of Fertility), plants of the mandrake kind find a place.

Theophrastus, the heir and successor of Aristotle, whom Linnæus styled "The Father of Botany," in his story of plants, wove into these legends the Strychnos manikon, or what is believed to be our Atropa belladonna.

The mandrake is intertwined in magic, in science, in religion, in art, in literature, in medicine, from the dawn of thought until now. Some of its repute is in part explicable by the real or fancied shape of the root, which presents a rude resemblance to the human figure.

The "Mandrake," from the famous Ortus Sanitatis, 1511.

The mandrake was fashioned out of the same earth whereof God created Adam. It became an idol to be worshipped, and a talisman to be carried about.

From the crude scratchings of the low savage, to the higher forms of art, the mandrake is found delineated in human shape, at times with leaves growing out of the head.

Dioscorides, from the first to the seventeenth century of Christianity, "held supremacy over all other botanists, not only of antiquity, but of all time." In medical botany he is still an authority. The most striking figure delineated in a fifteenth

century manuscript of one of his works, is that of a goddess handing the mandrake in human form to Dioscorides; underneath is a dog, with an inscription that in digging up the mandrake the dog perished.

From remote time the digging of the mandrake was a ceremonious procedure. With most due attention to the conjunc-

STRYCHNO-
MANIA
Explicans
STRYCHNI MANICI
Antiqcorum, vel
SOLANI FURIOSI
Recentiorum,
Hiſtoriæ monumentum,
Indolis nocumentum,
Antidoti documentum.
Quam, occaſione ſtragis, quâ crebritate, quâ celeritate, quâ gravitate mirabiliter noxiferæ, ac miſerabiliter neciferæ, in Ducali Würtemberg. ſede, quæ eſt Neoſtadij ad Cocharum, obortæ, Año 1667. prid. Kal. Septembris Styl. Jul.
Memoriæ
Cautelæ, Medelæ gr. publico bono dedicat,
JOHANNES MATTH. FABER, AUGUST. M. D.
Sereniſs. fuæ Celſit. ibid. à Conſil. Med. atque nunc Imperialis Heilbronnæ Poſtæ. Primar.
AUGUSTÆ VINDELICORUM,
Sumptibus Theophili Gœbelij, Bibliopolæ.
Typis Joannis Schönigkij. M DC LXXVII.

Title page. "Strychnomania," by Johannes Matth. Faber (1667). The first monograph on belladonna.

tion of stars, it was dug only on certain nights. For man to uproot or touch the living plant would bring disaster, perhaps death. A cord was tied to the plant and to a dog, and the dog was enticed by food to pull the plant out of the ground. The plant utters shrieks when uprooted, and the dog dies. All this with prescribed incantation, and the washing of the root in wine

and in running water, to remove the taint of the diabolic association.

The power of the mandrake and allied plants as love charms, is no doubt the origin of their world-wide popularity. In addition, they were endowed with the power of making the owner invulnerable and invisible. They could reveal hidden treasure, bring good fortune, ward off disaster, absorb and destroy evil influence, even disease. The primitive Arab name implies good fortune and good health.

The barbaric German name, Alrun, implying witch and wizard, or literally "all-wise one," was applied alike to the mandrake and to belladonna.

The belief of supernatural origin and power of the narcotic solanums was implanted in the natives of the American continent, independent of European tradition.

The Zuni Indians held an ancient tradition of a boy and girl who came from the interior of the earth, wearing a peculiar flower entwined in their hair. These beings had power of vision, divination, and of producing sleep. The Divine powers of the earth, fearing their influence, condemned them to eternal banishment to the interior of the earth. Flowering plants sprung up at the spot where the boy and girl disappeared into the earth. This plant was the "Ololiuhqui," the sacred plant of the Aztecs —our Datura meteloides. The Indians have classified this plant under the term which means Nightshade, and by evolution it has come to be known as "The Belladonna of the Zunis."

Here we have an independent origin of the "male and female" nightshade story, with the accompaniment of its supernatural and its natural narcotic power.

The mystic role of the narcotic solanums was not the only one utilized by primitive people. The priests of magic and medicine used them to produce visions, to stupefy and to cure. They appeared in religious ceremonies and in medicine.

The Luisenos tribes of Southern California use the "Indian nightshade" (Datura meteloides) in the initiation of boys into manhood. In darkness and in silence, the chief prepares a decoction of the root to the accompaniment of a weird chant. Each boy kneels and drinks the narcotic potion. Under the stupor overcomes them. After regaining consciousness the can-

didates are instructed in the arts and duties of manhood. This solemn occasion is made a rebirth, a baptism, through the nightshade.

The medicinal uses of the solanums went hand in hand with their use in magic and in religion. Their narcotic, stupefying power was utilized for the relief of pain, to produce sleep, to cure disease.

Forty centuries ago there was a formula for the cure of toothache by an oily mixture of hyoscyamus; the ceremonial smoke of stramonium leaves was applied as an antispasmodic, just as it is today; belladonna and allied solanums administered internally and externally, were used for their narcotic pain-dispelling power; belladonna, hyoscyamus and stramonium leaves were applied as a poultice where we now use a belladonna plaster.

The study of myth and legend is not an idle pastime. It has been held that myths are the allegorical forms for representing facts and phenomena; that if we dig under the fancies, fairy tales and legends, we find the facts.

The caveman and the nomad took the jimson-weed, the henbane, the mandrake, or the belladonna, and found in each what was to him a like miraculous power. Through the labor of scores of centuries, science grouped them together and evolved from each mydriatic alkaloids of similar, and in some instances identical, constitution. "Out of the fancies came facts."

Written Records.

The earliest of arts was the dance, with music, song and the spoken word. The next art was delineation—pictures cut, scratched, carved, painted on rock; stone writing, symbols, and finally characters, letters, written language.

The first real books were letters impressed in soft clay, baked in the sun. Herein is found records of the chase, war, prayers, medicine, records of the stars and of nations; rarely a delineation of a plant.

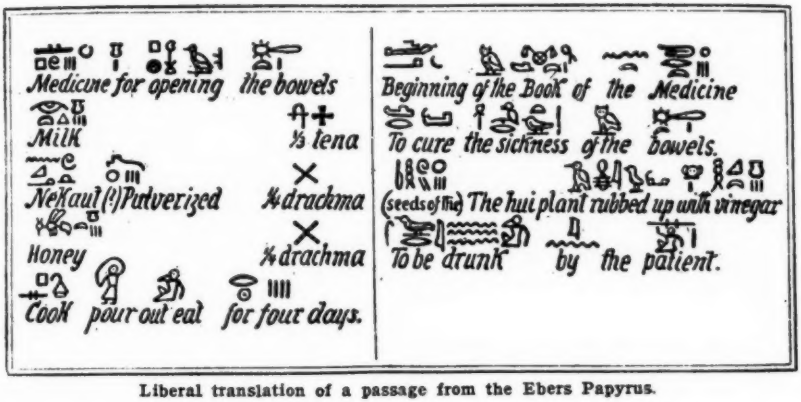
Writings come down to us inscribed from twenty to sixty centuries ago. In the centuries before Christ, books were made of silk, vellum, papyrus, palm leaves, tablets and sheets of bamboo fibre. The Chinese had books of paper.

In these rolls and scrolls we find mention of the nightshades in some form. Where we do find such a record, we may safely reason that the story is not the discovery of the scribe, but that he is simply recording legends, myths and knowledge that may be centuries old.

The British Museum contains medical manuscripts written perhaps twenty centuries before Christ, but recording prescriptions of a period ten to twenty centuries before the time of the writers.

Thus, in a historic search, when we have arrived at the point of a first written record, we find that we have only a story of something that was known ages before.

The famous Egyptian manuscript, known as the "Papyrus Ebers," now in the British Museum, gives us a vivid picture of medicine before the time of Moses. Herein is specific mention of the solanums, including mandragora and the henbanes.


Medicine for opening the bowels
Milk
½ lena
Nekaut (?) Pulverized
¼ drachma
Honey
¼ drachma
Cook pour out eat for four days.
Beginning of the Book of the Medicine
To cure the sickness of the bowels.
(seeds of the) The hui plant rubbed up with vinegar
To be drunk by the patient.

Liberal translation of a passage from the Ebers Papyrus.

Among Oriental people, medicine was hereditary, its science and secrets being kept within families and transmitted orally. The Datura is found in the most ancient Chinese and Japanese literature.

In the tradition of the ancient Taoists, the metel nut plant (a Datura) was brought from one of the circumpolar stars by a heavenly envoy, and its name "Man t'o lo hua," which is equivalent to our mandragora, was derived from the star.

Hindu chronology (probably erroneously) claims that thirty

to forty centuries before Christ, their savants, their physicians and their Brahmins had systems of astrology and medicine. They were familiar with the solanums, especially the Daturas, and used them in ointments and cataplasms. They knew their intoxicating power.

Among the ancient, as well as the modern Hindus, the metel nut (Datura meteloides) was the best known. From the Indian barbaric name "Dutra" comes the name Datura, given to the species.

It is notable that the Atropa belladonna luteus, which is found in the Himalayas, carries the name "Dutra."

From the time of the barbaric tribes, scores of centuries past, through Greek legend, poetry, art, literature and medicine, the solanums appear.

Esculapius (1200 B. C. [?]) was the Greek God of the Healing Art. Eight centuries later, in that brilliant age when Pericles ruled Athens, when Socrates walked barefoot through its streets, when Plato wrote—Hippocrates laid the foundations of medical science, recording the wisdom of the ages that had gone before. He introduced no new drugs, and so we may know that his enumeration of mandragora, hyoscyamus and "solanum" takes us back to centuries before his time.

The beginning of botany is attributed to Aristotle. He bequeathed his botanic garden to his friend and pupil, Theophrastus. In this garden the solanums were cultivated. Theophrastus lists and describes over five hundred plants, including certain ones which may be interpreted as mandragora, or as belladonna.

Under the symbol of the serpent, the Greek cult of medicine invaded Rome. As we approach the Christian Era, we reach the name of Dioscorides, the originator of medical botany—Materia Medica. For more than sixteen centuries the best books on materia medica were simply copies and comments upon Dioscorides. Even today our historic source for herbal therapy begins with Dioscorides, who records several sorts of solanums, notes their active principles and their use. His "Strychnos manikon" might be belladonna, and it is so placed by his commentators. He describes the mandrake, the henbane and the Datura.

The use of the narcotic solanums as an anæsthetic reaches back to remote antiquity. The Egyptians, Babylonians, Hebrews, Hindus and Arabs knew them and applied them as anæsthetics in surgery, and to ease the pangs of childbirth.

Dioscorides prescribed mandragora wine in surgery, and for pain. Later authorities substituted belladonna for mandragora.

Anæsthesia produced by the solanums is still in use among savage people. The latter day use of the narcotic solanum alkaloids for local anæsthesia, and in the famous twilight sleep, is the swing of the pendulum back to primitive man.

Amid showers of stone and ashes, choked by sulphurous gases, while striving to rescue the victims of the eruption of Vesuvius, that buried Pompeii and Herculaneum, there perished one whose work in the study of nature will live through all time —Pliny, the Elder.

Pliny's "Natural History" was a vast compilation of scientific knowledge from its beginning up to his day. Two thousand volumes, written by more than a hundred authors, were included in his search.

In Pliny, as in all historical studies of even a few plants, when we arrive at a supposed beginning point, we find our course points farther and farther backward, until we are lost in a prehistoric maze.

Pliny accepts the many myths and legends of the narcotic solanums, records their action and use in medicine. He names three sorts of solanums, one of which we believe was intended for the belladonna of today.

In the time of Marcus Aurelius lived Galen, born a Greek, educated into the arts of both a physician and an apothecary. A strenuous traveler, a writer of many volumes, an experimentalist, a profound student of drugs, whose doctrines and practices moved the world of medicine for fifteen centuries. Galen studied plants as they grew. His "galenicals," whose names we still retain, were made from plants gathered and prepared by his own hands.

Galen very fully, and quite clearly, for his time, describes three species of narcotic solanums—mandragora, henbane and dorycnium (belladonna), giving their properties, uses and preparations. To a degree a believer in charms, amulets and incantations, he ignores the fanciful legends of the mandrake. While ascribing to the narcotic solanum an occult power, he does not seem to believe that this is derived from the stars. In his time these simples were used as anæsthetics.

In Galen's system of pharmacodynamics, he noted the effect of a drug upon a perfectly healthy person, a patient slightly ailing, and finally upon a really sick man. He recognized the close relationship of the different species of narcotic solanums, and used them interchangeably.

Unique is Galen's table of medicines, which may be substituted one for another. In this table he gives several of the solanums which are interchangeable:

"Instead of dorycnium (belladonna)—the seed of henbane.

"Instead of winter cherry (halicacabus), the seed of strychnos.

"Instead of mandragora, dorycnium.

"Instead of the seed of henbane, the seed of sweet briar."

GALEN.

This essay is not intended to be connected or chronological; we can only gather here and there glimpses of the state and the progress of medicine, and from this a rather cursory view of the drugs which we are considering.

What has been termed the "Greco-Roman" period in medicine, was a most brilliant one. The influence of such great writers as Hippocrates, Dioscorides and Galen has swayed the

medical world even down to the present. The Serpent and Staff of Esculapius is still our symbol of medicine.

In a period following Galen (Post Classical Medicine), we have several representatives, such as Paul of Aegina who, in a voluminous epitome of medicine, surgery and materia medica, compiles and condenses the ancient authorities, and adds observations of his own.

The narcotic solanums of Aegina, are the nux methel (Datura meteloides), henbane, dorycnium (belladonna), and the mandragora. His botanical descriptions are very limited. His statements as to their poisonous and therapeutic action, so far as they go, would pass today as correct. The mandrake carries no superstitious legends.

Oribasius (325-403 A. D.), pharmacologist physician to Julian the Apostate, put together a great encyclopedia of medicine, carrying all the knowledge of the authorities that had gone before. While in this encyclopedia he noted the superstitions and legends of the narcotic solanums, in a popular treatise on medicine he eliminated them.

Aetius of Amida, a sixth century physician to the Emperor Justinian, was likewise a compiler. Some of his formulas became the basis of famous nostrums that came down almost to our time. The ancient pagan legends of the solanums are given by Aetius in Christianized form.

Early in the sixth century there was one Alexander of Trallis, a medical practitioner who, while paying due deference to the ancients, recorded his own observations and experience. Some of the remedies of Alexander show his association with the magic arts. He had great faith in the influence of the planets. Amulets found a place in his materia medica. The "Herb Nightshade" is applied externally, taken inwardly, and worn as an amulet or charm against gout, epilepsy and other maladies. At least one of the solanums had become a "sacred herb" to be gathered by due observance of the conjunction of the planets, with the use of prescribed incantations.

A late fourth century functionary of the Emperor Theodosius, Marcellus, an empiric, steeped his remedies in folk lore and tradition. Mandrake and other solanums, various herbs, parts of animals and insects, went into his compounds. Interesting is the fact that a rabbit's foot bound to the body of the patient by a cord made of rabbit's wool, forms one of his remedies.

In the Dark Ages.

A disjointed study, such as is here presented, cannot attempt to trace the changing course of nations and of people.

At the time of Galen, the influence and power of the Roman Empire dominated the world of science, art, literature and trade. Christianity was as obscure as Rome was splendid.

Two centuries later all had changed. The followers of the Galilean had triumphed through persecution. Constantine had placed the cross upon his banner. The seeds had been sown that led to the downfall of the glorious Roman Empire. Pagan philosophy and Pagan medicine were suppressed. The invading barbarian hordes completed the annihilation of the splendid period of Greco-Roman medicine.

Then began the period popularly known as the "Dark Ages." In this period occurred the astonishing rise and progress of Arab power. The followers of Islam quickly assimilated the learning of the Greeks and Romans, and advanced the arts and sciences, as well as commerce and war.

It was the Arabs who translated the works of Hippocrates, Galen and Aristotle. It was the Arabs who brought chemistry, medicine and pharmacy into a darkened world, and pursued them with particular eagerness. The Arabs preserved for us the ancient knowledge and lore of the narcotic solanums, especially so in respect to the Daturas.

It has been erroneously assumed that the mingling of astrological superstitions with medicine is traceable to the Arabs. Historically this is scarcely possible. So far as the influence of the planets over the narcotic solanums is concerned, this is to be found in many lands and many nations long prior to the rise of Mohammedanism. Before the Eastern Conquest, it had been instilled into Greek and Roman materia medica.

With the oncoming of the Medieval Period, from about the sixth, to the revival of learning in the fifteenth century—learning, philosophy, science, religion and medicine passed into the cloister, and with them went the narcotic solanums.

The monks practiced medicine as a work of piety and charity. Aversion to profane acquirements engendered a study of science, and a neglect of the use of ordinary remedies. Sickness and disease were the result of sin. Prayers, relics of the martyrs, charisms, took the place of drugs. Poisonous narcotic

herbs, such as the mandrake and other nightshades, owed their mysterious power to the evil one, and thus passed under the ban.

Here we have a backward swing to the old Stone Age. Health and disease are controlled by good and evil gods or spirits; herbs likewise are under the influence of either evil or beneficent planets. Hence, the primitive priest, magician and medicine man, with incantations, charms and witchcraft, and the medieval monk, with prayers and miracles, held kindred beliefs.

The glory of this period is the establishment of hospitals and asylums for the sick, the injured and the poor. Surgery was separated from medicine, and relegated to the barbers.

During the Middle Ages, European humanity was scourged with epidemics such as were never equaled before or since. These centuries saw the patronage of the church by the state, and the rise of the great medieval universities, in which the doctor received his degree of Doctor in Philosophy and Medicine.

From the monastic institutions came the physic gardens, in which drug plants were grown. In these we gain inklings of a definite knowledge of the narcotic solanums, including the Daturas from the East. The mandrake, henbanes and belladonna are cultivated and studied, and their relationship takes shape.

The literature of the Middle Ages, up to the invention of printing (1438), was written. In the cells of the monks, day after day, year after year, through the centuries, they inscribed on parchment, vellum and paper—devotions, breviaries, scriptures. They made translations from Hebrew, Arabic and Greek into the Latin tongue. The monks were authors, illustrators, producers and makers of books, all in manuscript.

Many tomes of the Middle Ages still exist, and it is with a feeling of awe and reverence that one takes up the yellow, faded, worn and crumbling volumes. Among them are gems of the bookmakers art. Their vellum covers are chased, ornately inlaid, hinged and clasped. To open such a book is as if to enter a sacred shrine. Every page pours forth the spirit of centuries-gone author and transcriber; every letter is as an engraved plate—full, clear, round. Initial letters and chapter headings are in color and gold, filling out a well wrought design. Illustrations are there, unique and exquisitely drawn, finished

in color. Every folio presents a new phase, a new example of medieval art.

As we lay our hands upon the pages to decipher the text, we are transported back through the centuries into the cloister cell where, under a dim light, we kneel at the feet of the author monk. He speaks, his words envelop the mind and fill the soul. Often the name of the writer or scribe is omitted, or is designedly disguised. They wrought and they wrote, not for pay, not for fame! Their life, their all, they gave to preserve and to transcribe the truth as they saw it.

These old manuscripts cover every phase of human knowledge of the age when written down. In digging into them, one of ten finds that some fine theory, the boasted discovery of a modern age, had its roots deep in these thousand-year-old "scraps of paper." Possibly if we had time to sift them apart we would find therein answers to some of the problems we now vainly try to solve.

Much of our knowledge of ancient beliefs has come to us without intervening alteration, but classical literature, including philosophy and medicine, herbs and drugs, reaches us after being edited, censored, selected, expurgated by medieval monks. In this process there have been additions, alterations, rejections.

One could spend a lifetime delving among these musty tomes. It would probably be a period of great pleasure and satisfaction to the searcher. No material profit would accrue, but humanity might be the gainer.

We can note here only a few out of many instances which seem to pertain to our theme:

To the Middle Ages we owe the preservation and transmission of Dioscorides.

Apuleius.—Most famous was the Herbarium of Apuleius, an author of unknown identity, who claimed to have received his knowledge of herbs from the centaur Chiron.

Many versions of the Herbarium existed in the Middle Ages. Some of these have a Pagan trend. In other manuscripts, heathen prayers and incantations are replaced by the Lord's Prayer or the paternoster.

The manuscripts of Apuleius are noteworthy for their illuminations of the herbs in vivid colors.

The mandragora attains a high rank. The usual way of showing this plant is that of a human form with leaves grown out of the head. The man is led by a dog chained to his waist, typifying the old, old legend of the use of the dog or other animal when digging powerful drug plants.

Besides the mandrake, some authors seem to identify either hyoscyamus or belladonna among the narcotic plants in the Herbarium.

Isidore of Seville.—In the sixth century, Isidore, Bishop of Seville, recorded the work of the ancients in concise, definite form. In a measure, Isidore is a connecting link in preserving and conveying learning through the ages.

While recording the ancient facts of science, the good Bishop rejects or omits the marvelous powers which heathen superstition attributed to many herbs. Of great interest is his mention of the use of the mandragora as an anæsthetic in surgical operations.

From the remote past there was a knowledge of the use of narcotic drugs as a stupefying agent in surgery. The medical annals of every race and nation note their use.

The narcotic solanums always appear in these formulas.

Somewhere in the ages there was evolved the "Soporific Sponge"; a sponge steeped in a mixture of narcotic drugs which, when moistened, was placed over the part to be operated upon. Held under the nostrils it produced unconsciousness. The Sponge was sometimes used to lessen the pain of victims to be subjected to torture.

Some writers have, without good evidence, intimated that it was a narcotic sponge that was extended to the Saviour, as He hung upon the cross, and was by Him rejected.

Leech-Book.—The tenth century produced an Anglo-Saxon treatise, the "Leech-Book of Bald and Cild," in which there are extracts from the ancient writers; likewise for the first time native English herbs are brought into use.

In plucking herbs use is made of Christian symbols, forms of prayer, the sign of the cross, masses and psalms.

Herbs or medicine supposedly under the influence of evil spirits, are subject to special exorcism. As an example, a mix-

ture of herbs containing henbane, is put in a vessel beneath the altar, and nine masses said over it.

St. Hildegarde.—From "Fair Bingen on the Rhine" there came a sibyl and saint, who filled an exalted place in the twelfth century—St. Hildegarde. Abbess of a Benedictine monastery, she was famed for her religious visions and oracles, her cures of disease, and her knowledge of herbs. In later centuries she would have been placed among the mountebanks, and possibly burned or drowned as an herb woman who delved in witchcraft.

Guided by voices from heaven, she committed her knowledge to writing. Contrary to the nature of womankind, she proudly recorded her age as the decades rolled by.

Her medical knowledge was mixed with religion and the science of her day. Untrained in Latin, she claims to have been able to speak and write it through miraculous power. To drugs and herbs, however, she gives vernacular names.

Her list of herbs was fairly large, but rational. There are apparently several solanums, the mandrake being clearly distinguishable. In the mandrake the influence of the devil is more potent than in other herbs. The evil influence in the mandrake is destroyed when it is purified in a fountain for a day and a night. When purified, it has curative power when applied or eaten with the use of prayer and incantation. The last is as essential as is the virtue of the mandragora.

Pharmacognosists may well pay tribute to the shrine of St. Hildegarde. She added medicated potions to her miraculous cures; through the centuries that followed, her influence restored the lost faith in drugs and herbs.

Macer.—Out of the darkness there came a pharmacognostic poet whose real name is unknown; he assumed the title of Macer, a classical poet of the time of Virgil.

He sang of herbs and their virtues in over two thousand lines. Usually the herbs are named, but sometimes they must be identified by solving their poetic disguise. Of the narcotic solanums, at least two—the mandrake and hyoscyamus—are in the lines.

The Rebirth.

The centuries which have been labeled the "Dark" or "Medieval," contain contributions to science, the arts, and to medicine, that are well worthy of consideration. The word "Medieval" is not symbolic of ignorance.

It was a Frenchman who tersely stated that "the therapeutics of one generation are always absurd to the second succeeding generation." It is to be hoped that our generation will not be judged a thousand years from now by the theories which we hold, and especially by our accepted, often ineffectual, and sometimes harmful, remedies.

It was in this period that Arab pharmacy brought the art of distillation and tinctures, with the struggle for commercial supremacy—spices, gums and rare drugs, from the East. These included the Oriental Daturas.

This period witnessed the rise of alchemy, laying the foundations of modern chemistry. Upon the bontanical science of Theophrastus, the building of the superstructure of modern botany was begun.

The close of the Middle Ages was the dawn of our own time. In the transition from the medieval to modern conditions, events ran swiftly. The invention of gunpowder, the downfall of feudalism, the navigation of the globe, the discovery of America. The two last events are within our study. The Daturas were found in all the Americas, and in many islands, and were used in religion, medicine and witchcraft.

The so-called Renaissance saw the revival and extension of learning; the invention of printing, the greatest agent for the uplifting of mankind by self-education; the great religious Reformation, by which science and medicine and the arts were in part separated from the restrictions of the church.

While we are well past the Dark and Middle Ages, we are still in the Renaissance, the rebirth, the revival and extension of education, of science, art, medicine, pharmacy and pharmacognosy.

The Herbals.

As soon as man learned to make books, he wrote into them some of his religion, his magic, and his medicine. This was the beginning of the Herbals, a sort of a medical handbook. Primarily for his own use, and for those who followed him, he

inscribed written words, phrases, sayings or descriptions, to take the place of the spoken formula.

The oldest medical writings we have are the papyri, which are really medical handbooks or herbals. The priest, medical man and magician, wrote their herbal on skin or bark. The painted characters and words, as well as the herbs of which they wrote, even the thing on which the writing was made, carried curative power.

Through the classic ages of medicine, such volumes as Hippocrates, Dioscorides and Galen, were the philosophical guides in medicine, but beyond this was the Herbal—the medicine book of the people.

The man who wrote an Herbal was looked upon as an inspired savant. To possess a copy of such a work was as to be the custodian of a shrine. The sick and the afflicted made long pilgrimages so that they might see, might touch, might have the Herbal interpreted to them.

A copy of an Herbal, plus a little hokus pokus, brought to the medicine faker notoriety and coin. Such books were the pharmacopeias of the apothecary.

Through the centuries the manuscript herbals were copied and recopied, and circulated throughout every nation that possessed a written language. In the long centuries of the Dark and Middle Ages, when learning was shut up in the cloister, the Herbal carried medicine to the people throughout all Europe.

The Bible was the first book chosen to exhibit the newly discovered art of printing. The Herbal followed, and easily attained to the position of "best seller."

While the more scientific works, which are classed as herbals, were in the Latin tongue, the most popular were printed in the language of the country where issued (vulgar tongue).

The nightshades generally occupy the center of the stage in the herbals. No herbal could hope to attain popularity unless it delineated the mandrake surrounded by mysticism and lore. The male mandrake and the female mandrake were delineated with heads covered with leaves; hairy fibres covered the body, which represented the stalk, the arms were the branches, the legs and feet were the roots, the toes the rootlets, and in many cases there appeared the dog tied to the plant to uproot it.

Confusing, but interesting to the historical searcher, is the fact that the illustrations appearing in the early herbals, were pirated by the wily publishers, sometimes redrawn, but often the same drawing appears under different captions. At times

D. IACOBI THEODORI
TABERNÆMONTANI,
New vollkommen
Kräuter-Buch
Darinnen
Vber 3000. Kräuter / mit schönen vnd
künstlichen Figuren / auch deren Vnderscheid vnd
Wirckung / sampt ihren Namen in mancherley Sprachen / be-
schrieben: Desgleichen auch / wie dieselbige in allerhand
Kranckheiten beyderley Menschen vnd des Viehs /
sollen angewendet vnd gebraucht werden /
angezeigt wird.
Vormahls
Durch D. CASPARVM BAVHINVM
mit vielen newen Figuren / nutzlichen Artzneyen vnd andern
guten Stücken / nie sonderem Fleiß ge-
bessert.
Jetzt widerumb auffs newe übersehen / mit nutzlichen Mar-
ginalien / Synonimis, (so insonderheit im Andern vnd
Dritten Theil gemangelt) Regulirt vnd andern
vermehrt
Durch HIERONYMVM BAVHINVM, D.
Korem, vnd der Vniver
Ordinarium.
Getruckt zu Basel / durch Jacob Werenfels / in
Verlegung Johann Königs
M. DC. LXIV.

Title page of "New Krauter Buch," herbal, 1664. Note the elaborate engraving, representing herbs, herbalists, plant gardens, etc.

the author simply uses the term "nightshade," or its equivalent, without any qualification as to species. The henbanes appear with frequency; the Daturas, generally called stramonium, are described with regularity.

The identification of belladonna in the early herbals, before the name "belladonna" became specifically attached to the plant, is in some respects uncertain. Authorities are agreed that in the list of drugs for the use of apothecaries, by Saladinus of Ascoli in 1450, the name "Solatrum furiale" means our belladonna. Likewise, that "De Solastro-rustico" in "La Grant Herbier en francois" (Paris, about 1504) is belladonna.

It is to be understood, however, that these are not the first references to belladonna, which plant is found in the writings of classical authors, and appears in the written and printed herbals under confusing titles.

Leonhard Fuchs, a Bavarian physician and botanist, 1501-1566. In his work is the beginning of a natural system of grouping plants.

The glory of the herbals is the illustrations. Some of them are to our eyes crude; many are wonderful portrayals of artistic skill, exhibiting figures of exceptional beauty. Even where the artist had never seen the living plant, he produced a picture worth looking at. The drawings were decorative, following conventions, without regard to proportions. Hence, we see leaves longer than the branches.

In the better specimens, the picture was intended to illustrate the text, and to help the apothecary, the herb gatherer and the reader to recognize the plant.

There were editions de luxe in the printed herbals, wherein the illustrations were colored by hand. In other issues the figures were produced in outline, and the owner of the book filled in the color scheme.

The herbals were made to sell. In them the mandrake is the central figure. The artists were not always sure of the other narcotic solanums, and they appear under titles that form an entrancing puzzle.

Master hands executed the delineations in the Herbal of Fuchs (doctor, botanist, scientist), "De Historia Stirpium," 1542. Fuchs has among the narcotic solanums, the Solanum nigrum. His mandrake delineates the plant as it grew, without

Solanum hortense, from "De Historia Stirpium," of Leonhard Fuchs. Believed to be the first delineation of the belladonna plant.

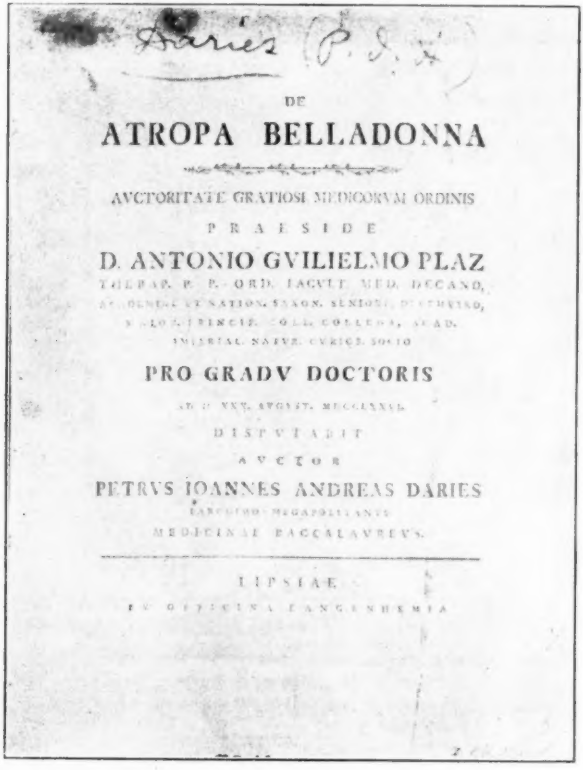
the exaggerated human attributes. Stramonium (Datura metel), is not classed with the nightshades, but near them. He gives what is considered by authorities the first authentic drawing of belladonna, under the title Solarium somniferum, or Dollkraut.

We have in Fuch's work a striking portrait of the author, together with the pictures of the artists who so faithfully drew his fine figures of medicinal plants.

As we lovingly look upon the marvelous line, shade and color in these old herbals, we may reflect that we are gazing upon a faithful mirror of plants as they grew centuries ago.

Monographs.

Treatise devoted to the natural order Solanaceæ are few in number. The favorite drug for writers of monographs has been the mandrake. Upwards of three score works have been



DE

ATROPA BELLADONNA

AVCTORITATE GRATIOSI MEDICORVM ORDINIS

PRAESIDE

D. ANTONIO GVILIELMO PLAZ

PETRVS IOANNES ANDREAS DARIES

MEDICINAE BACCALAVREVS.

LIPSIAE

Title page. Inaugural thesis "De Atropa Belladonna," by Peter Joannes Daries (1724). A drug clerk, whose labors led to the use of belladonna as a mydriatic.

published. For the most part it is the legendary lore of the mandrake, and not its botanical or medicinal attributes, that are covered by these writers.

Monographs relating specifically to hyoscyamus and the Daturas, have not been prolific.

Through the ages, writings on belladonna appear in medical literature, but there was no monograph until late in the seventeenth century. Prior to 1800, we find the following monographs upon belladonna:

Faber, J. M.—Strychnomania, explicans Strychni Manici antiquorum vel Solani Furiosi recentiorum Historiæ monumentum, Indolis nocumentum, Antidoti documentum. . . . August. Vindel., 1677, 4 to pp. 107, tab. 13.

Sicelius, C. C.—Diatribe botanico-medica de Belladonna seu Solano furioso. . . . Jena, 1724.

Daries, P. J. A.—De Atropa Belladonna. Præs. A. W. Plaz. . . . Leipzig, 1776.

The brilliant gem is Faber's unique volume. The title rendered into English, runs somewhat as follows:

STRYCHNOMANIA

Explaining

Strychnum Manicum of the Ancients

or

Solanum Furiosum of the More Recent,

The Record of the History

The Injury of the Native Quality

The Evidence of the Antidote

Which on the occasion of the Slaughter, in what Frequency, with what Celerity, in what Severity, Marvelously the Poison-bearing, Mournfully the Death-bearing,

In the Dukedom of Wurtemberg, in the Palace which is Neustadt-at-Cocharum,

Occurred in the year 1667, on the day before the Calends of September, Julian Style

To the Memory of the Prevention, of the Healing

Dedicated for the Public Good

By Johannes Matthæus Faber, M. D., of Augusta, Of his most serene Prince, Greatest, from the Medical Council, and now Imperial Primary City Physician of Heilbronn. Augusta Vindelicorum. At the costs of Theophilus Goebel, Bookseller, from the types of Joannis Schoenigkius. MDCLXXVII.

Faber was a Wurttemberg physician, serving for a time as physician to the Duke of Wurttemberg, and as chief physician to the City of Heilbronn. He was evidently a man of erudition.

Suddenly confronted with fourteen cases of poisoning through the eating of belladonna berries, he started a systematic study of the plant, and after ten years of labor produced a volume of one hundred and twenty-eight pages, in Latin text,

Frontispiece of Faber's "Strychnomania." Rays from the planets descend upon the narcotic solanums, imparting to them narcotic powers, causing mania, disease, death. "Belladonna is a child of Saturn, a companion of Mars."

with twelve etchings on copper. He gives the literature of the drug, making some two hundred citations.

Following the history of his own cases, there is given a list of twenty-six species of solanums, including belladonna. His

description of the belladonna plant, and its life history, is evidently direct from the living plant, and save for a change of terms, would stand good today.

In this volume we find the first attempt to give a list of synonyms for belladonna. Up to his time Faber covers the whole range as to the properties of root, leaf and berries, their "benign" and poisonous powers, their action, their use in medicine and the treatment for poisoning by the drug.

Faber was a scholar, physician, artist and poet. Astrological botany runs through his work. "Belladonna is a child of Saturn, a companion of Mars." The growth, the peculiar powers of the plant, for good and for evil, and its action upon man, are controlled through the conjunction of the stars. Its particular form, and shape of leaf, root, flower and stem, are the "signatures" through which its actions are to be read.

Faber quotes freely from authorities in many languages, and relieves his pages with his own verse and quotations from the Greek and Latin classics.

In "Strychnomania" the frontispiece is an elaborate astrological production of his own design. In the firmament are the planets, accompanied by their zodiacal symbols. On the shield of the central figure, Mars, is the word "strychnomania," and the weapon in the hand of the figure is entwined with a spray of belladonna. Rays of light converge from the planets to the trees and plants upon the earth below. Among these plants are the belladonna and solanums. Skeletons and bodies of the dead, men who have been blinded and are suffering from mania, exhibit the effects of belladonna as derived from the stars.

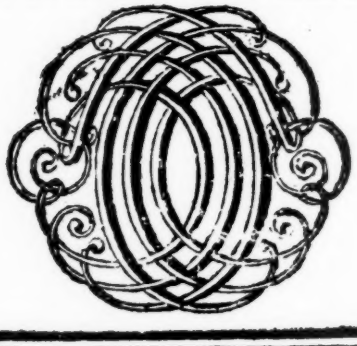
This finely executed etching aptly represents Faber's idea as to the source of power found in belladonna, and its peculiar effects upon mankind.

Hi swork will stand through centuries to come as a model, showing what one man with restricted facilities can do in the study of one theme, one plant—belladonna.

More than fifty years after Faber, the second monograph on belladonna came as an inaugural dissertation by Christopher Conrad Sicelius (1724), under the title "Botanico-Medical Dissertation Concerning Belladonna, or Solanum Furiosum." It is interesting from a historical point of view.

Again, a half a century (1776), and the third monograph on belladonna appears—an inaugural dissertation by Peter John

DIATRIBE
BOTANICO-MEDICA
DE
BELLADONNA
SIVE
SOLANO FV-RIOSO
AVCTORE
CHRISTOPHORO CONRADO
SICELIO
M. D. & Practico Nordhuſano.



IENÆ,
APVD HENR. CHRISTOPH. CRÖKERVM

Title page. Inaugural thesis, Christopher C. Sicelio (1724). One of the three important monographs on belladonna.

Andrew Daries. A rather hastily prepared graduation thesis, filled with citations of authorities in his time, modern.

Daries' century was called a "toxophilic" age. Belladonna and other poisons were abrogated and rejected. He did attempt to revive belladonna, and restore it to its proper place in medicine. He covers its botanical character, its "constituted principles," the toxic and salutary effects of the various parts of the plant antidotes, etc.

Historically unique is his own "personal observations," wherein he believes himself to be the discoverer of the mydriatic effects of the drug, and becomes a pioneer in pharmacology.

While a drug clerk, by accident a drop of the fresh juice of belladonna was spattered into his eye, and dilation of the pupil followed. In conjunction with a Dr. Reimer, he conceived the idea that this power could be utilized in operations upon the eye, and he began experimenting by dropping belladonna into the eyes of birds, cats and other animals, forestalling the work of the next century, wherein came the wonderful development in the use of belladonna in the eye.

Discovered, lost, and rediscovered through the centuries from the Stone Age down to the early years of 1800, was the historical fate of the mydriatic action of belladonna.

Finally, behind another prescription counter, again a drug clerk, Runge (1810), spattered some belladonna into his eye, and in his brain there started a train of thought, and behold! a "stuff" which he called "Kormegyn" (magnifier of the pupil). From out of this later came the atropine of Meins.

Glory, laud and honor to the humble drug clerks whose labors on belladonna poured out blessings on mankind!

Conclusion.

In our rambles we have spanned fifty centuries more or less. We have reached to the nineteenth, when botany, pharmacology, materia medica and allied sciences take on a systematic form. The status of the narcotic solanums has become entrenched on a rational basis.

While there are yet many journeys to go, we must bring this rhapsodic composition to a close. Intentionally, it has been unmethodical and disconnected. To present in chronological succession the long line of contributions devoted to such a group of plants as are here considered, or to any one of them, would be the work of a lifetime—perhaps more than one lifetime.

In respect to the narcotic nightshade group, important data seems hopelessly wanting.

The importance of these plants through the centuries stands as a great fact in history. Starting at the beginning of things, and roaming here and there through the ages, we find that "much has been written, much forgotten, and but little is really known." We never arrive at the end. But even a haphazard ramble among these important drug plants is a pleasant, and may become a useful task.

To the younger, or to the older, student of drugs, the lesson seems to be that a desultory ramble through a group of drug plants, or even the study of a single plant, can become an interesting pastime. But beyond this is the fact that in the realm of drugs there are still worlds waiting for the conqueror.

NOTE ON GRANT'S TEST FOR SPARTEINE.

By James Fitton Couch.

A few years ago Mr. E. H. Grant published an excellent test for the alkaloid sparteine[1] sensitive enough to detect 0.5 mg. of the alkaloid. The mechanism of the test is unknown but it may depend upon the peculiar tertiary linkages of the nitrogen atoms in sparteine. Several other lupine alkaloids are closely related to sparteine, and it was thought of interest to determine whether these would react to the test. Accordingly the procedure described by Grant was applied to several alkaloids from different lupines with the following results.

Lupinine, $C_{10}H_{19}ON$, was prepared from *Lupinus luteus* in which the plant it occurs associated with sparteine. The two alkaloids were separated by the method of Willstätter and Fourneau[2] and the crystalline lupinine was used for the test. This alkaloid did not respond to the test; the only change that occurred was the development of a faint flush instead of a bright pink when the brominated product was exposed to ammonia. This coloration may well have been caused by traces of sparteine retained in the lupinine.

Spathulatine, $C_{33}H_{64}O_5N_4$, prepared from Lupinus spathulatus,[3] also yielded negative results when the test was applied. *d-*

[1] *J. Am. Pharm. Assoc.*, 9, 704, 1920.
[2] *Arch. Pharm.*, 240, 235, 1902.
[3] *J. Am. Chem. Soc.*, 46, 2507, 1924.

Lupanine, $C_{15}H_{24}ON_2$, from *L. augustifolius*, *dl*-lupanine, $C_{30}H_{48}O_2N_4$, from *L. albus*, and hydroxylupanine, $C_{15}H_{24}O_2N_2$, from L. polyphyllus, were all negative. These results indicate that the Grant test is very specific for sparteine and it should have an important application in the chemistry of the lupines. In addition nicotine, which somewhat resembles sparteine, is also negative to this test.

During the investigation of this test a modification of the technique was developed which avoids certain of the inconvenient features of the original method. The alkaloid is extracted from ammoniacal solution with chloroform as in the original test. Part of the chloroform solution is pipetted off and allowed to run on to a strip of filter paper so as to moisten three-quarters to one inch of the length of the strip. The chloroform is allowed to evaporate in air, and when quite dry the strip is held in the neck of a bottle of bromine water for a few seconds. A yellow stain appears on the area wetted by the chloroform. The strip is then inserted in the neck of a bottle of strong ammonia, when the yellow stain bleaches out. On warming the strip over a hot plate or electric stove the bright pink color of the test develops. By this manipulation the test may be completed in five minutes or less and appears to be as sensitive as the original test.

This method avoids the tedious evaporation of the bromination mixture just to dryness on a water bath and the danger of overheating the reaction product and spoiling the test.

BUTESIN PICRATE, A NEW TYPE OF ANESTHETIC-ANTISEPTIC.*

Floyd K. Thayer.

In spite of the very extensive research done in the last fifty years on both naturally occurring and synthetic medicinals, it is a rare occurrence to find both antiseptic and anesthetic action combined in the same compound. Where both actions are found, one or the other is quite certain to be only incidental to the main physiologic function of the compound, for example: the mild analgesic action of phenol compared to its germicidal power; or the

*Read before the Division of Chemistry of Medicinal Products A. C. S. Milwaukee, September, 1923.

very slight antiseptic action of anesthetics of the orthoform type.[1] To increase the dosage to a point where both functions would be definitely apparent is likely to bring about undesirable, and perhaps, toxic reactions.

Picric acid has long been known to possess antiseptic properties.[2] Its phenol coefficient as given by different authors varies from 4 to 7. Recent literature [3] points out the value of picric acid as an antiseptic, especially in the treatment of burns.

Knowing the ability of picric acid to form salts with basic compounds, it was thought to be worth while to make an attempt to combine it with an anesthetic. The anesthetic chosen was the n-butyl ester of para-amino-benzoic acid which hereafter, for the sake of brevity, will be called butesin. Butesin is of the water insoluble type; its anesthetic effect is two to four itmes that of anesthesin.

Butesin picrate is prepared by reacting, in a suitable solvent, two molecular equivalents of butesin with one of picric acid. Benzene has been found to be a very suitable reaction solvent. It is not necessary to reflux the benzene solution of the two components; the slightly warmed benzene solution of picric acid is added to the benzene solution of butesin, agitated, allowed to stand several hours, and the product filtered off.

If desired, water can be used as the reaction medium. In this case the butesin, which is soluble in water only 1 part in 7700. must be held in solution by two mols. of hydrochloric acid—thus its solubility in water is increased to approximately 1 part in 200. Picric acid forms a 1.2% aqueous solution at room temperature. Butesin picrate, with a solubility of only 1 part in 2000 parts of water, readily separates when an aqueous solution of picric acid is added to the butesin hydrochloride solution.

A modification of the aqueous solvent method is to add an alcoholic solution of butesin to the aqueous solution of picric acid (these two solutions can be used either cold or slightly warm). The reaction mixture is stirred vigorously and allowed to cool. The flocculent product is filtered off, or, better still, is separated by centrifuging and then thoroughly washed with water. This is perhaps the easiest and most satisfactory procedure of the three.

The product isolated from any of these three methods is a yellow solid. It is amorphous or crystalline in appearance, depend-

ing upon whether the aqueous or the benzene reaction solvent is used. The melting point is 109-110°. Butesin picrate is odorless, but has a slightly bitter taste.

Analyses indicate that it is a compound containing 1 molecule of picric acid to 2 molecules of butesin.

$C_6H_2(NO_2)_3OH \cdot 2\,NH_2—C_6H_4—COOC_4H_9$ (n)

Picric Acid:

1. Titration of an alcoholic solution of butesin picrate with $N/_{10}$ NaOH using methyl red as an indicator.

0.5000 gm. substance: 8.05 cc. $N/_{10}$ NaOH.
Butesin picrate, Calculated, 37.2% picric acid.
Found 36.9%.

2. Precipitation as the insoluble nitron-picrate and weighing.

0.5000 gm. substance: 0.4269 Gm. nitron-picrate.
Butesin picrate, Calculated, 37.2% picric acid.
Found 36.13%.

n-Butyl-p-aminobenzoate:

1. Hydrolysis with boiling alkali and the reacting of the resulting p-aminobenzoic acid with $N/_{10}$ bromine, titrating the excess of bromine and find amount taken up by aminobenzoic acid.

0.1200 gm. substance: 23.49 cc. $N/_{10}$ bromine.
Butesin picrate, Calculated, 62.8% butesin.
Found, 62.64%.

2. Isolation of the butesin by repeated extractions with ether from aqueous-ammonia solution.

1.0000 gm. substance: 0.6232 gm. (n)-butyl-p-aminobenzoate. Butesin picrate, Calculated, 63.8% of butesin. Found 62.32%.

Butesin picrate is soluble in water in the proportion of 1 part in 2000; in cottonseed oil, 1 part in 100. In organic solvents, such as alcohol and ether, it is readily soluble.

Butesin picrate, synthesized with the purpose of obtaining both anesthetic and antiseptic action in the same chemical compound,

was submitted not only to pharmacological tests, but to bacteriological examination as well.

As a means of ascertaining its anesthetic efficiency, and at the same time testing for possible irritation, the eye of a rabbit is flooded for one minute with a 1:2000 aqueous solution of butesin picrate. Immediately after the instillation the point of a pencil can be drawn across the cornea of the eye, without the rabbit showing the slightest sign of winking. The duration of this anesthesia is from fifteen to twenty minutes. At no time was any irritation noticeable.

Rabbits have received direct into the circulation over 4.5 cubic centimeters of the saturated aqueous solution per kilogram bodyweight, without any untoward effect.

Pure cultures of streptococci and staphylococci isolated from a burn were tested with an aqueous solution of butesin picrate.

1 :2000 killed staphylococcus aureus in 5 minutes.

1 :2500 killed streptococcus pyogenes in 15 minutes.

The first application of butesin picrate as a therapeutic remedy—its use in the treatment of burns—was naturally suggested by the presence of the picric acid. For clinical purposes butesin picrate has been applied in ointments, oil solution and dusting powder.

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3. Ehrenfried, *Jour. Am. Med. Assoc.*, 56, 412, 1911; Pack, *Jour. Ind. Hyg.*, IV, 501, 1923.

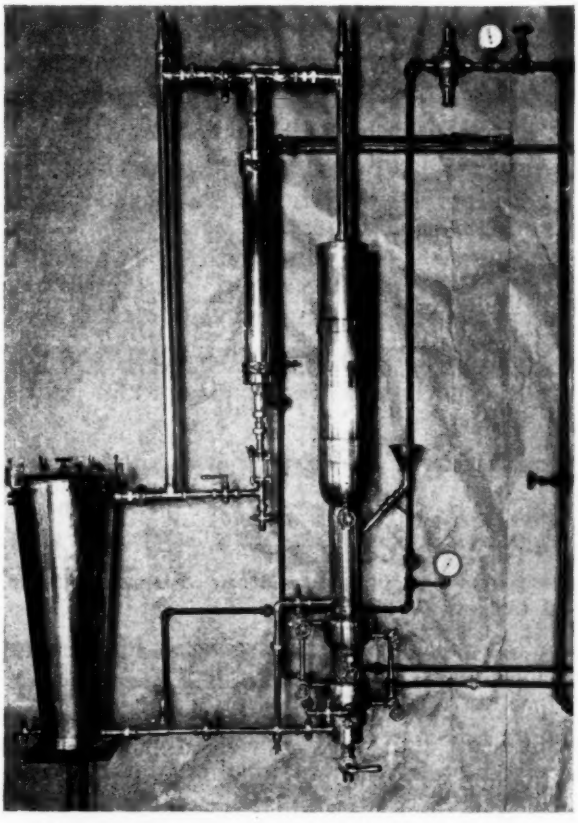
Research Department, The Abbott Laboratories,
Chicago, Illinois.

CONTINUOUS EXTRACTION APPARATUS.

The apparatus here illustrated was recently donated by Lloyd Brothers, of Cincinnati, to the Philadelphia College of Pharmacy and Science, of which Dr. John Uri Lloyd, the inventor, is an alumnus.

The combined extraction and distillation apparatus shows the latest development of a series of apparatus constructed for small and large scale operations in plant extraction.

Assuming the apparatus in operation, we find the percolator (tank at left) fairly well filled with solvent, the liquid level in the concentrator (column at right) heated by a steam coil or jacket surrounding the column. Another jacket, both for steam or cold water, is placed below the first. As soon as the liquid is vaporized by the steam heat, the vapor rises, is condensed in the water-cooled jacket surrounding the tube to the left of vapor column and is either collected as distillate or permitted to flow back to the percolator.



CONTINUOUS EXTRACTION APPARATUS (LLOYD).

The concentrated extract is obtained through a spigot at the bottom of the concentrating column.

Inasmuch as no open flame is used, the apparatus is perfectly

safe for extraction experiments with inflammable solvents, including even ether. With steam pressure adjusted and steady water supply, the extraction can be made continuous without loss of solvent, thus saving in time and material. It appears possible to apply vacuum, though this has not been tried out by us.

Lloyd's main invention to permit rapid concentration of plant extracts at minimum exposure to heat has evidently been fulfilled. To the praises expressed by Dr. G. F. Beal, Chemical Laboratory, Urbana, Ill., using this apparatus in his work with anthraquinones, Dr. L. S. Palmer, Department of Agriculture-Biochemistry, Minnesota, extracting with it vitamines, Dr. F. B. Kilmer, Director of the Johnson and Johnson Chemical Laboratories and others, we are glad, as a result of experiments with digitalis, to add our enthusiastic tribute.

PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE,
BIOLOGICAL AND MICROANALYTICAL LABORATORIES,
ARNO VIEHOEVER, *Director.*

ABSTRACTED AND REPRINTED ARTICLES

ADULTERATION OF MEDICINAL ALCOHOLIC BEVERAGES.*

Joseph Samuel Hepburn, A. M., B. S. in Chem., M. S., Ph. D.

Contribution from the Constantine Hering Research Laboratory, Hahnemann Medical College of Philadelphia.

The current or ninth decennial revision of the United States Pharmacopœia [1] does not contain spiritus frumenti or whisky as an official drug. Consequently no legal standard of strength, quality or purity for medicinal whisky exists under either the Federal Food and Drugs Act of June 30, 1906, or the Pennsylvania Drugs Act of May 8, 1909. As a result, the definition [2] of whisky—straight, blend,

*Reprinted from *Hahnemannian Monthly.*

[1] Pharmacopœia of the United States of America, Ninth Decennial Revision, page LXII.

[2] United States Department of Agriculture, Food Inspection Decision, No. 45 (1900), No. 65 (1907), No. 95 (1908), No. 98 (1908), No. 113 (1910).

compound, and imitation—which was for several years a weighty legal question, is again unsettled. Adulteration of whisky is frequent, usually by addition of alcohol, water, and caramel; the product has approximately the same alcohol content as true whisky while its color is due, in part at least, to the presence of the caramel.

The alcohol used for this purpose quite frequently is unfit and unsafe for ingestion. It may be medicated,[3] completely denatured,[4] or specially denatured.[4]

Medicated alcohol may contain: Formaldehyde, glycerol (glycerine), phenol (carbolic acid), tannin (tannic acid), camphor, compound solution of cresol (liquor cresolis compositus U. S. P.), alum.

Completely denatured alcohol may contain: Wood alcohol (containing methyl alcohol and acetone), pyridine bases, ethyl ether, benzin, benzene (benzol), nitrobenzene, ortho nitrotoluene, pine oil.

Specially denatured alcohol may contain:

Other alcohols: Wood alcohol, commercially pure methyl alcohol, isopropyl alcohol, normal butyl alcohol.

Hydrocarbons: Benzene, petroleum naphtha, kerosene.

Esters: Ethyl acetate, diethyl phthalate.

Essential oils of: Rosemary, peppermint, lavender flowers, wintergreen, cloves, cassia.

Aldehydes: Formaldehyde, acetaldehyde.

Acids: Sulphuric, acetic, citric, benzoic.

Soaps: Hard or soft.

Bases. Ammonia, aniline, pyridine.

Alkaloids: Nicotine, emetine, quinine, cinchonidine, brucine.

Dyes: Fast yellow Y, tetrazo brilliant blue 12 B, methyl violet, methylene blue, erythrosin.

Acetone.

Ethyl ether.

Aliphatic compounds: Chloroform, glycerol, tetrachloroethane (acetylene tetrachloride).

Aromatic compounds: Phenol, resorcinol, thymol, eucalyptol; menthol, camphor, tannin.

Drugs: Arnica, ipecac, quassia.

[3] Treasury Department, Bureau of Internal Revenue, Prohibition Unit. Regulations 60 Relative to Intoxicating Liquor. Revised, March, 1924.

[4] Treasury Department, United States Internal Revenue, Regulations 61 Relative to . . . Industrial Alcohol and to . . . Denatured Alcohol. Appendix II, Sept., 1922.

Iodine.

Metallic salts: Ammonium iodide, potassium iodide, cadmium iodide, red mercuric iodide, zinc chloride, sodium salicylate.

Other substances: Vinegar, shellac, pine tar, animal oil of Dipple containing pyrrol.

The denaturants, which may be present in a given sample of medicated or denatured alcohol, depend upon its type and the particular formula used for medication or denaturation. The restrictions upon many formulas for the manufacture of specially denatured alcohol are such that the illegitimate use of the particular product is entirely prevented.

Practically all the compounds and substances enumerated above have a pharmacodynamic action in minute doses, a physiological action in larger doses, and a toxicological action in still larger doses. As a rule, the action on a diseased person with lowered resistance would be more marked than on a healthy individual. However, the adulterator, who violates either or both the revenue and prohibition laws for his personal profit, is not particularly concerned in the effect of his product upon the health and life of his victim.

Of course, such denaturants as dyes, iodine, soaps, ammonia, and the oil of Dippel are so readily detected by physical examination that they are not likely to appear in a medicinal whisky.

The detection of adulterants is a problem in advanced analytical chemistry, and by no means an easy task. It cannot be entrusted to a technician. Today, the course for a baccalaureate degree in chemistry in a professional school is four years in length, and three additional years are required to attain the doctorate.

A few examples may be given to illustrate the methods of testing and the use of differential reactions.

In order to test for methyl alcohol, formaldehyde, and acetone, the sample must be distilled, and suitable tests applied to the distillate.

The presence of acetone suggests the use of wood alcohol as a denaturant, and necessitates tests for methyl alcohol.

The presence of formaldehyde likewise necessitates tests for methyl alcohol. If an attempt has been made to remove aldehydes by distillation over an alkali, the formaldehyde yields methyl alcohol and a formate.

To test for methyl alcohol in the presence of formaldehyde, the chemist must treat the distillate from the sample with sodium cyanide to remove formaldehyde, redistill, and test this new distillate for

methyl alcohol. Since this second distillate contains ammonium and cyanogen compounds, it is highly toxic and must be handled with great care.

Tests for methyl alcohol involve the use of differential reactions, to which methyl alcohol responds while ethyl alcohol remains inert.

The test for diethyl phthalate is, in a sense, spectacular. This ester is extracted from whisky by means of petroleum ether. If the ester be present, the residue obtained on evaporation of the ether has first a bitter, then a burning taste. The residue is heated first with sodium hydroxide, then with sulphuric acid and resorcinol. The phthalate is converted into resorcinolphthalein or fluorescein, a water-soluble, fluorescent compound, whose green fluorescence is intensified by rendering the solution alkaline. This ester is not especially toxic. Handy and Hoyt [5] found that the chief symptoms, produced by oral administration to a cat of a dose of approximately 75 milligrams per kilo of body weight, were decreased appetite and increased sluggishness of the animal. However, its presence is evidence of adulteration and a danger signal.

In addition to the metallic salts enumerated above, antimony in the form of tartar emetic may be present if certain alcoholic toilet preparations have been used as adulterants. The metals may be detected by the usual procedures of analytical chemistry.

The author has examined a number of samples of whisky, gin, champagne, and alcohol, submitted by or through physicians and intended for medicinal use. Qualitative tests have usually been made for heavy metals, phenol, acetone, methyl alcohol, formaldehyde, diethyl, phthalate, benzin, benzene, ethyl ether, and caramel.

Of twenty samples examined, four contained formaldehyde, and two contained methyl alcohol. Of ten samples of whisky, three contained caramel showing that they were in part synthetic products. None of the other denaturants was found. The Pharmacopœia [6] formerly required that whisky contain between 44 and 55 per cent. of alcohol by volume, or between 37 and 47.5 per cent. of alcohol by weight. Three samples, which were free from denaturants, contained respectively 43.12, 37.96, and 34.68 per cent. of alcohol by volume or 37.20, 32.28, and 29.49 per cent. of alcohol by weight. They, therefore, were deficient in alcohol content.

[5] Journal of the American Pharmaceutical Association, 1924, XIII, 709.

[6] Pharmacopœia of the United States of America, Eighth Decennial Revision, page 418.

Two samples of champagne were free from denaturants, but their malic acid content was comparatively high, being 0.437 and 0.425 per cent. respectively. This demonstrated that they were derived from apple juice rather than grape juice.

A sample of "bootleg" alcohol submitted through the college hospital, was found to contain an appreciable quantity of diethyl phthalate.

In view of the adulteration of whisky, it is extremely fortunate that the forthcoming tenth decennial revision of the United States Pharmacopœia will contain standards of purity for whisky and brandy as medicine.[7] These standards will be the legal standards of purity, and will greatly assist the medical profession and the public in obtaining these drugs in a pure state when required for therapeutic use.

[7] Journal of the American Pharmaceutical Association, 1924, III, 159.

(The whisky text of the forthcoming Pharmacopœia is appended. There may be some minor changes introduced but the pharmacopœial monograph will be substantially as follows.—Editor.)

SPIRITUS FRUMENTI.

Whisky.

Sp. Frum.

Whisky is an alcoholic liquid obtained by the distillation of the fermented mash of wholly or partly malted cereal grains and containing not less than 47 and not more than 53 per cent. by volume of C_2H_5OH at 15.6° C. It must have been stored in charred wood containers for a period of not less than four years.

Description and Physical Properties.

A light to deep amber-colored liquid, having a characteristic odor and taste and an acid reaction.

Specific gravity: from 0.923 to 0.935 at 25° C.

Tests for Identity and Impurities.

The residue obtained by evaporating 20 cc. of Whisky in a dish on a water bath is not completely soluble in 5 cc. of distilled water. Filter the solution and add to the filtrate a drop of diluted ferric

chloride T. S. (1 in 10). A greenish-black coloration is produced (indicating storage in wood barrels).

A 30 cc. portion of Whisky, diluted with 100 cc. of distilled water, requires for neutralization not less than 3 cc. nor more than 10 cc. of tenth-normal sodium hydroxide, using 5 drops of phenolphthalein T. S. as indicator.

Mix 100 cc. of Whisky with 15 cc. of distilled water and slowly distill 100 cc., using an efficient condenser. Neutralize 50 cc. of the distillate with tenth-normal sodium hydroxide, using 5 drops of phenolphthalein T. S. as indicator, then add exactly 20 cc. more of the tenth-normal sodium hydroxide and boil for one hour under a reflux condenser. Cool and titrate the excess of alkali with tenth-normal sulphuric acid. Run a blank test using distilled water in place of the distillate and make any necessary correction. The volume of tenth-normal sodium hydroxide consumed is not less than 1.7 cc. and not more than 7 cc.

To 5 cc. of the distillate add 2 cc. of sodium hydroxide T. S. and 5 drops of a freshly prepared aqueous solution of sodium nitroprusside (1 in 50), then add a slight excess of acetic acid: no violet tint is produced in one minute (*acetone*).

A mixture of 0.5 cc. of the distillate with 5 cc. of distilled water meets the requirements of the test for *Methanol* under *Alcohol*.

Acidulate 10 cc. of Whisky with 5 drops of diluted hydrochloric acid and evaporate to 5 cc. Dilute with distilled water to 10 cc. and filter if necessary; the addition of iodine T. S. or mercuric potassium iodide T. S. yields no precipitate (*alkaloids*).

Dilute 10 cc. of Whisky with 2 cc. of distilled water, transfer to a test tube and shake gently for two minutes with 15 cc. of a mixture of 100 cc. of amyl alcohol, 3 cc. phosphoric acid, and 3 cc. of distilled water, and allow the layers to separate completely; the lower aqueous layer is colorless or very nearly so (*caramel*).

Mix 5 cc. of Whisky with 5 cc. of distilled water and shake the mixture with 10 cc. of purified petroleum benzin. Transfer the separated benzin to a dish of from 70 to 80 cc. capacity, add 1 cc. of sodium hydroxide solution (1 in 10) and evaporate to dryness on a water bath. Add to the dry residue 2 cc. of sulphuric acid, rotating the acid in the dish so that the residue will be completely moistened. Heat for two minutes on a water bath, and pour the solution into a dry test tube containing from 0.03 to 0.05 gm. of resorcinol. Heat the mixture for three minutes at 160° to 170° C., shaking at inter-

vals to dissolve all of the resorcinol. Then pour the solution into a mixture of 70 cc. of distilled water and 30 cc. of sodium hydroxide solution (1 in 10), adding more sodium hydroxide, if necessary, to make the mixture alkaline. The liquid shows no yellowish-green fluorescence after standing twenty-four hours (*diethylphthalate*).

Mix 2 cc. of an aqueous solution of phloroglucinol (1 in 100) with 5 cc. of sodium hydroxide T. S. and add 2 cc. of Whisky; no red color is produced (*formaldehyde*).

Mix 20 cc. of Whisky with 20 cc. of distilled water and shake the mixture with 10 cc. of ether. Allow the mixture to stand until separation takes place, separate the ether layer and allow it to evaporate spontaneously on a watch glass; the residue has no disagreeable or irritating odor.

Evaporate 20 cc. of Whisky in a dish on a water bath and dry the residue to constant weight at 100° C.; the weight of the residue does not exceed 0.10 cm. This residue is not sticky, it has a slightly astringent taste but is not distinctly sweet or bitter (*glycerin, sugar, etc.*).

Evaporate 10 cc. of Whisky to 5 cc. and dilute with 10 cc. of distilled water, acidulate with 5 drops of hydrochloric acid and add 10 cc. of hydrogen sulphide T. S.: no precipitate is formed before or after rendering alkaline with ammonia T. S. (heavy metals).

Place 2 cc. of mercuricsulphate T. S. in a test tube, add 5 drops of Whisky and heat the mixture just to boiling over a small Bunsen burner, and remove it from the flame; no yellow precipitate is formed (*iso-propyl alcohol*).

The addition of an excess of bromine T. S. to 5 cc. of Whisky, diluted with an equal volume of distilled water, produces no precipitate (*phenols*).

MEDICAL AND PHARMACEUTICAL NOTES

INTOXICATION BY INHALATION.—A recent communication to a medical journal calls attention to a new form of depravity current in certain uncertain circles of our social superstratum. According to this informant a new "amusement" known as the "Carbona Jag" is in vogue among groups attending a school for young "ladies." A

saturated handkerchief is held close to the nose and the constant inhalation of the vapor seems to be the jagee's *modus operandi*—the effect is described as similar to that produced by large quantities of alcohol. Carbona is said to be a mixture of purified gasoline and carbon tetrachloride, a queer enough intoxicating combination, for with it one becomes "lit up" and extinguished concomitantly.

It is obvious, however, that this pernicious habit, frequently indulged, cannot but produce in time, disastrous physiologic changes.

CURRENCY AND THE SPREAD OF DISEASE.—How long can a germ live on a dollar? That depends whether the dollar is a bill or a coin. K. H. Kiefer (Schweiz Apoth. Zeitung, 1924, *62*, 296) attributes the recent spread of certain skin infections in Germany to the prevalence of paper money.

Having examined a large number of paper notes of diverse origin, Kiefer found living germs on all. These organisms include micrococci, bacilli, actinomycetes and yeasts, often in considerable numbers. The condition of the paper naturally has an important bearing on the number of germs present. Relatively few are present in new smooth notes, but the dirty, crinkled paper money frequently met with in the curency often carried innumerable organisms. Moreover, the pathogenic organisms were found to retain their vitality on paper money much longer than has been hitherto suspected. The pus-producing streptococcus remained alive for 54 hours, the typhoid bacillus for 11 to 16 days, and the paratyphoid bacillus for 25 to 138 days. It is, therefore, quite evident that the circulation of paper money in large quantities, especially when in the filthy condition often met with, presents serious facilities for the spread of grave infectious diseases. Investigation has shown that metal currency does not possess this dangerous disadvantage. Coins have been found to afford no serious menace to the public health as germ-carriers. Even when infected with disease-producing germs, their life on the metal surface is but brief.

In this country, then, one might say that the typhoid fever germ can live much longer on a dollar bill than it can on a gold eagle.

FOENUGREEK, A NEW COD LIVER OIL SUBSTITUTE.—Foenugreek, famous as a substitute maple flavor and as an ingredient in cattle "condition powder," now comes to the front as a cod liver oil sub-

stitute. It seems that it has a chemical composition not unlike that of cod liver oil in that it contains several alkaloids and other basic nitrogenous bodies among which are methylamines, cholin, neurin, and betain, which are derived from the splitting up of lecithins, in addition to phosphates and nucleo albumin. These substances, like the alkaloids in cod liver oil, stimulate the appetite by their action on the nervous system, or produce diuretic or ureo-poietic effect. The drug is given in powder-form, the dose being two teaspoonfuls daily suspended in broth, milk or jam.

Besides, it must be remembered that it has a taste which, even if bitter, is distinctly more to the liking of the young hopeful than that of the hated oil of livers. Foenugreek consists of the seeds of *Trigonella foenum-graecum (Leguminosæ)*.

ELEMENT 61.—Element 61, one of the five missing silent builders of the universe, may soon come to fill its place around the periodic table.

Prof. C. J. Lapp, of the University of Iowa, has recently reported his systematic search for this elusive element, which, though not heretofore detected by chemical or physical means, has had many of its properties predicted. Element 61 is known to be a rare earth, in the same class with cerium, whose oxides are used in the manufacture of gas mantles. There is a vacant space in the periodic table of chemical elements between number 60, neodymium, and 62, samarium, waiting to be filled.

One faint clew to missing element 61 has been found by Prof. Lapp. By examining some samples of rare earths carefully prepared by his colleague, B. S. Hopkins, he has discovered a single and very faint line in the spectrum produced by X-rays reflected onto a photographic plate from the rare earth sample. This line is not claimed by any other chemical element and corresponds very closely in wave-length to a line predicted on theoretical considerations as belonging to element 61. On this evidence, Prof. Lapp believes it likely that element 61 is present in his samples of rare earths in quantities of about 1 part in 2000 or less.

The rare earths include such unfamiliar elements as: cerium, præsodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, cassiopeium.

There are now only five missing chemical elements, including number 61. All the rest of the ninety-two elements, from the lightest, hydrogen, to the heaviest, uranium, have been discovered. Numbers 43, 75, 85, and 87 are among the missing.

BARIUM SULPHATE AGAIN; TEST FOR BARIUM CARBONATE.—According to a report of the Federal department of public health, several deaths have occurred recently in Germany, as well as in other countries, through the use of barium sulphate as a contrast agent in roentgenography. The barium sulphate was in these cases found to be strongly contaminated with soluble barium compounds or with compounds that became dissolved by the acid gastric juice. Of itself, barium sulphate, when pure, is a harmless agent when used internally as has been proved beyond question during the last fourteen years since Prof. Paul Krause (formerly in Bonn, now in Münster) introduced this insoluble barium compound into medical diagnosis for the purpose mentioned. In the two recent cases in Germany in which loss of human life has resulted from the use of barium sulphate, the preparations of barium sulphate employed were found to contain upward of 50 per cent. of barium carbonate.

The official method of testing barium sulphate for its content in barium carbonate and soluble barium compounds follows: About 5 gm. of the barium sulphate to be examined is placed in a flask or beaker; 50 cc. of a 10 per cent. solution of acetic acid is added and the contents are shaken, at which time it should be noted whether or not carbonic acid is developed. Since any evolution of carbonic acid would point to the presence of barium carbonate, such a finding would awaken grave suspicions against the preparation, and it should not be used for roentgenographic transillumination purposes. As a rule, no evolution of carbonic acid will be noted, and after the contents of the flask have been boiled for a few minutes, the undissolved barium sulphate is allowed to settle and the supernatant fluid is poured off through a filter paper. The resulting filtrate, which will usually be turbid, is then thoroughly shaken after a small quantity of animal charcoal on the point of a knife has been added. The filtrate is then refiltered if necessary two or three times until it has become entirely clear. To about 25 cc. of the clear filtrate a few drops of dilute sulphuric acid are then added. If inside half an hour the filtrate becomes turbid, the preparation should be rejected, as it

contains 0.1 per cent. or more of barium carbonate or soluble barium compounds. If the filtrate remains clear, the barium may be safely used as a contrast agent in roentgenographic work.

SANOCRYSIN—FOR TUBERCULOSIS.—It is the heart-rending disappointments which have been so frequently the lot of the tuberculous sufferer that causes the *Journal of the American Medical Association* to write most conservatively of the reputed benefits which seem to have followed treatment of the dreaded malady with this complex preparation of gold, called "sanocrysin." And one only has to remember the horrible worthlessness of the essence of turtle that Friedman concocted, and the sad failure of the much-heralded tuberculins as curative agents—to realize how humbugged and harassed has been the way of those unfortunates who suffer from the ravages of the great white plague. Theirs has been hope ever and again rekindled only to end each time in the inevitable darkness of disappointment.

Again this hope that springs eternal is reawakened—and it is not kindness alone—but wisdom—that prompts this cynical attitude of the herald of medical progress in America towards the new alleged "remedy."

"The most recent method to receive the sensational publicity duly accorded any venture in the treatment of tuberculosis is a preparation of gold, advanced in Denmark under the name 'sanocrysin.' As reported in the *Ugeskrift for Læger,* meetings were held in Copenhagen, October 28 and 29, at which investigators of the new remedy gave their results to the Danish medical profession. Professor Moellgaard, the originator of the remedy, described its production, and stated that no reaction follows the introduction into the body of this remedy by the intravenous method, provided the tissues are healthy; but if they are tuberculous, a violent reaction ensues. It is assumed that the reaction is the result of release of material from tubercle bacilli that are destroyed by the remedy. The reaction is opposed by the injection of a specially prepared horse serum which, Moellgaard believes, already has greatly reduced the severity of the phenomena of the reaction. At the conference in Copenhagen, Moellgaard described the complete clinical recovery of two monkeys with severe tuberculous infection, following the use of his method. Several well-known Danish clinicians reported brilliant results in

the cases of many patients. However, there were several instances in which death had followed the administration of the remedy, presumably on account of difficulty in determining accurately the proper dosage. In discussing this work, the *British Medical Journal* points out that the most cautious of the speakers was Professor Moellgaard himself, and that he had been exceedingly reserved in his forecasts of the efficacy of 'sanocrysin.' In any event, it is also reported that Professor Moellgaard has asked the Medical Research Council of Great Britain to organize an investigation of the properties of the remedy. No doubt, information will become available in the near future which will indicate more adequately whether or not the drug has any real virtues in a condition in which heretofore all remedies heralded as specific have failed."

THE PROGRESS OF SCIENCE IN 1924.—Scarlet fever conquered, mercury turned into gold, the world circled by airplanes, photographs sent by radio and wire, stars given thirty trillion years of life, new stellar universes a million light years away discovered, vitamins isolated, ultra-violet light found to influence life processes.

These were some of the signal triumphs of science during 1924.

The discovery of the cause and the devising of a cure and susceptibility test for scarlet fever was the most important development of the year. Drs. George F. Dick and Gladys Henry Dick, husband and wife, working at the John McCormick Institute of Infectious Diseases, Chicago, demonstrated that hemolytic streptococci caused scarlet fever, that the use of a filtrate from a culture of this organism injected under the skin would produce a reaction if the person were not immune to scarlet fever, and that a preventive serum could be produced. Dr. A. R. Dochez, of New York, and Dr. F. G. Blake, of the Yale Medical School, also made contributions to the conquest of scarlet fever. A gradual but successful campaign against this disease will be the result of the development of these new weapons.

From Germany came reports that the age-old dream of the alchemists, the transmutation of a base metal into gold, has been accomplished. Prof. Miethe, of Berlin, found minute amounts of gold in the mercury of a mercury vapor lamp that had been used in experimental work. Although other laboratories have not yet checked the results and the quantities of gold are far too small to be

commercially interesting, it is admitted that production of gold from mercury is theoretically possible and may have been accomplished.

Among other notable events and developments in the allied fields of medicine and chemistry the following stand out as most important:

The development of the most efficient process yet devised for the fixation of atmospheric nitrogen was announced by the United States Department of Agriculture.

The artificial synthesis of sugars from formaldehyde by means of radiations from the quartz mercury vapor lamp was demonstrated.

The development of tetraethyl lead motor fuel led to a great improvement in automotive engineering, but also brought with it serious problems in public health, due to the poisonousness of the compound.

Commercially practicable processes for the manufacture of new sugars have been devised by Government chemists. Maltose from cornstarch was the accomplishment of the workers in the Department of Agriculture, and levulose from Jerusalem artichoke is promised by Bureau of Standards chemists.

Treatment of cotton with concentrated nitric acid, making it resemble wool, was developed in Europe.

Cocaine was synthesized by Prof. Richard Willstaetter at Berlin.

Ethane, a constituent of natural gas, was found to "double up," with the formation of octane, an oil, under the influence of radium emanation. Drs. S. C. Lind and D. C. Bardwell, United States Bureau of Mines, performed the experiments.

Smelting of phosphate rock replaces a process of wet chemical extraction in fertilizer production, under direction of United States Department of Agriculture, thereby saving manufacturing costs and freight charges.

Hafnium, youngest chemical element, proved common in the earth's crust when analysts started looking for it.

In addition to the "fertility vitamin," or Vitamin "X," necessary for normal reproduction, Dr. Herbert M. Evans, of the University of California, has discovered a "lactation vitamin" necessary for the production of milk by mammals.

The ovarian hormone which experiments show is responsible for the sex urge and the appearance of secondary sexual characteristics in female animals and human beings, was isolated by Dr. Edgar Allen, University of Missouri, and Dr. Edward A. Doisy, Washington University Medical School.

A crystalline compound with the physiological properties of Vitamin B, and believed to be identical with that substance, was isolated from brewers' yeast by Dr. Atherton Seidell, of the United States Public Health Service.

A new and severe disease of the central nervous system, resembling meningitis, caused an epidemic in Japan.

Yellow fever, thought to be exterminated in Central America and Mexico, recurred in San Salvador and exists in Brazil.

There was an ominous increase in the incidence of smallpox in the United States.

A decreasing death rate from diabetes was noted, due, presumably, to the general use of insulin.

The number of drug addicts in the United States was found to be definitely on the decline.—*Science Service.*

Finds Germ Cause of Epidemic Hiccough.—Hiccoughs are not always a sign of inebriety; they may be the symptom of a genuine and very distressing epidemic disease. Dr. Edward G. Rosenow, of the Mayo Foundation at Rochester, Minnesota, has isolated the germ that causes epidemic hiccough.

The organism is a minute, spherical germ occurring in long strings. Technically it is known as a Streptococcus, and it is similar in form to the organisms that are active in severe tonsilitis and in certain forms of blood poisoning. While the disease is not particularly dangerous it causes much discomfort, for the unhappy victim hiccoughs continually for from two to eight hours. Dr. Rosenow has proven that the germ he has isolated is really the cause of the disease, for animals that he inoculated with it were attacked with spasms of the diaphragm. He explains that the peculiar action is due to a poison produced by the germ, which acts on the nervous system and provokes the violent hiccoughing.—*Science Service.*

Offending Defensive Reactions with Drugs.—One of the drawbacks of symptomatic treatment is the risk we run of tampering with reactions which have for object the defence of the organism. Take diarrhœa, for instance. In most cases this is protective; it is nature's way of getting rid of peccant matter from the alimentary canal. To seek to bottle it up by means of astringent drugs is to

court disaster. As a matter of fact, an aperient is usually indicated far more than an astringent. Then, too, with arterio-sclerosis, in most instances a high blood-pressure is a reaction of defence. Without it the circulation could not be carried on. Fortunately our efforts to control blood pressure usually fall short of the mark unless our measures are aimed at the underlying cause of the heightened tension. The blood pressure, after all, is only one manifestation of a complex syndrome. We meet with patients who live a comfortable existence with a pressure of 250 to 300 mm., while others die with a pressure not exceeding 190 mm., so that there are other factors to be considered when we are confronted with this circulatory disturbance. These remarks apply *mutatis mutandis* to fever. We are aware that the optimum temperature for most micro-organisms that infest human beings is that which is normal for man, consequently a rise of several degrees tends to hamper their proliferation. It follows that it is not only unnecessary, but is distinctly inadvisable to administer antipyretics merely for the purpose of reducing the temperature except, of course, in cases where life is threatened by a high temperature *per se*. If we can attack the cause of the fever as does quinine in malaria and the salicylates in rheumatism, well and good, but the popular practice of giving a dose of aspirin just to lower the fever is irrational and has nothing to recommend it.—*Medical Press and Circular*, March 5, 1924, through *Pharm. Journ.*

BOOK REVIEWS.

Germany is the birthplace and home of the so-called "Kalenders" which are published annually for practically all professions and trades. They are not merely calendars, or almanachs or diaries, but contain a mine of valuable information so as to make them handy reference books. The well-known publisher, Julius Springer, Berlin, W. 9, submitted the following two, of interest to pharmacists, for review:

PHARMAZEUTISCHER KALENDER, 1925. Von Ernst Urban. In 3 Teilen.

When in 1860 Dr. Hermann Hager, the master of pharmacy, originated the "Pharmazeutischer Kalender," he certainly did not

dream that this foundation would last so long and support a building three stories high. Since 1923 the Kalender consists of three separate parts, namely:

I. Taschenbuch, bound in cloth, contains a diary, blank note paper and a tabulation of medicinal plants, which flower and those which should be collected each month. It should be remembered that the Apotheker, especially in country districts, has a natural love for botanizing and collects and dries many plants. The first plant mentioned which flowers in January is *Helleborus* and the last one flowering in September is *Colchicum* (for that reason named "autumnale").

II. Handbuch, also bound in cloth, is divided into three chapters, of which the second is the most important, namely, "Information for Prescription Department and Laboratory." Besides the many valuable tables this chapter contains a mass of information which is of daily use as f. i. Rules for Dispensing, Prescription Latin, Abbreviations, Maximum Doses, Veterinary Doses, Newer Remedies, Poisons and Antidotes, Incompatibilities, Berlin Formulary (F. M. B.), Photographic Formulas, Removal of Stains, Disinfection, Physical and Analytical Constants, Homœopathic Pharmacy, Specific Gravity, Extract, Ash and Alkaloid Content of Drugs, Dry Residue of Fluid Extracts and Tinctures, Reagents, etc. Truly a "multum in parvo," extremely useful behind prescription counter and in the laboratory! Besides, the little volume is of such size as to be carried in the pocket.

III. Addressbuch, bound in paper, contains Statistics, German, Swiss and Dutch Pharmaceutical Associations, Boards of Pharmacy, Universities and their Faculties, Military Pharmacy, Domestic and Foreign Pharmaceutical and Scientific Journals, Addresses of Pharmacies and Pharmacists in Germany, Luxemburg, Switzerland and Holland and Buyers' Directory and Advertisements. It is perhaps needless to mention that among the Pharmaceutical Literature in the United States THE AMERICAN JOURNAL OF PHARMACY, established in 1825, is duly mentioned!

It is to be hoped that this valuable Pharmazeutischer Kalender will continue to live and prosper and also become better known among pharmacists in the United States.

CHEMIKER-KALENDER, 1925. Von Prof. Dr. Walther Roth. In 2 Teilen.

Originated by Dr. Rudolf Biedermann in 1879, this popular Chemists' Year Book is now before us in its forty-sixth volume. It is divided into two parts, each one being bound in durable cloth for laboratory use.

Vol. I, besides the usual diary and blank note paper, contains the following valuable tables, all in a condensed form: Atomic and Molecular Weight, Properties of Inorganic, Organic and Technical Chemicals, Specific Gravity of Solids, Gas and Solutions, especially of Alkaloids, Acids, Salts and Alcohols, Solubilities, Analysis, Volumetric, Gravimetric, Gas and Electrolysis.

Vol. II is cleverly divided into two parts:

1. Physics and Physical Chemistry, containing chapters on Mathematics, Weights and Measures, Atomic and Molecular Weights, Eudiometry, Barometry, Thermometry, Expansion, Thermochemistry, Specific Heat, Latent Heat, Statics and Kinetics, Optics, Electrochemistry, Colloidchemistry, Radiochemistry, Physiological Chemistry, Fats, Waxes, Resins and Bitumins and many other chapters.

2. Technical-Chemical Methods. Besides the chapters on General Methods and Special Methods for the examination of Fuel, Lubricants, Water, Soils, Air and Metals, the most reliable methods are given which are used in the chemical industry of Sulphur, Nitrogen, Chlorine, Fluorine, Alkalies, Potassium Salts, Aluminum, Fertilizers, Ceramics, Glass, Cement, Explosives, etc.

The Chemiker-Kalender furnishes a mass of useful and accurate data, arranged in a convenient handy book form. It is an ideal laboratory companion for both chemist and pharmacist.

OTTO RAUBENHEIMER, Ph. M.

THE "WELCOME" PHOTOGRAPHIC EXPOSURE CALCULATOR 1925.—The turn of the year is an excellent time for good resolutions and he who now decides to make this book his adviser during the coming twelve months will never regret the decision. For many photographers this has become a fixed habit and they will require no additional urge to obtain the 1925 edition at the earliest possible moment. They will find that the familiar "format" is retained but a glance through its pages reveals many interesting alterations and additions.

Notable among the latter is a concise description of development with the aid of a desensitiser. Two methods are given, in the one, "Tabloid" Desensitiser is used dissolved in plain water; in the other this product is dissolved in the developer itself. In both cases simplicity and convenience in working have been attained.

Another useful new feature is a comprehensive list of comparative speeds of development papers and lantern plates. The figures are in true relation with the well-known plate and film factors used in connection with the "Wellcome" Exposure Calculator. The compilation and constant revision of these factors must involve much time and labor, and photographers are to be congratulated on having the results tabulated in so handy a form. In all, over 280 plates and films—including the new brands—and more than 100 kinds of bromides and gas-light papers and lantern plates are classified.

Few readers will fail to make use of the form which now appears on the back of the January light table. This page, detached and posted to Burroughs, Wellcome & Company, entitles users of the handbook to free photographic advice and literature during the year.

The book is, as usual, well illustrated, the frontispiece showing beautiful pictures of the Taj Mahal by moonlight—rendered realistic by toning with "Tabloid" Blue Toner—and a sunny courtyard of the Alhambra, Spain. In the latter the graceful Moorish architecture and the remarkable range of tones from soft shadows to brilliant high lights are admirably reproduced. The decorations used throughout are based on Grecian vase designs, the chief headpieces depicting the Sun God, Helios, driving the solar chariot.

LANG'S GERMAN-ENGLISH DICTIONARY of terms used in Medicine and in the Allied Sciences, Third Edition, revised by Dr. Wm. K. Meyers, P. Blakiston's Son & Co., Philadelphia. Price, $7.

Pharmacists who have occasion to consult the German journals of Pharmacy or of Chemistry, or who have German recipes or prescriptions presented for compounding, find frequent occasion to consult a dictionary. It is therefore of some interest to know that this volume, which is primarily a medical dictionary, includes the pharmacopœial and common names of medicines, the scientific and common names of chemicals which find frequent use in the industries, and the German names of household remedies. Tech-

nical terms employed in connection with pharmaceutical, chemical, and microscopical operations, are also given.

The book contains more than 600 pages, and something like 53,000 definitions.

It is well-printed, on good paper, and is bound in black buckram.

J. W. S.